VANCOUVER

CONFERENCE CAHR 2018

27th Annual Canadian Conference on HIV/AIDS Research

April 26-29, 2018
Vancouver, British Columbia

CONGRÈS DE L'ACRV 2018

27e Congrès annuel canadien de recherche sur le VIH/sida

Du 26 au 29 avril 2018
Vancouver, Colombie-Britannique

Celebrating Our Diversity: Uniting in the Response to HIV

Célébrons notre diversité: Unis en réponse au VIH

ABSTRACTS
ABRÉGÉS

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Canadian Association for
HIV Research

L'association canadienne de
recherche sur le VIH

CAHR 2018

Celebrating our Diversity: Uniting in the Response to HIV

27th Annual Canadian Conference on HIV/AIDS Research

ACRV 2018

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Abstracts / Abrégés

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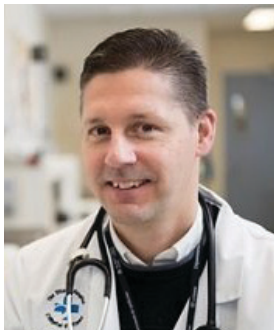
Message from the CAHR President / Message du président de l'ACRV



The Canadian Association for HIV Research (CAHR) welcomes you to the 27th Annual Canadian Conference on HIV/AIDS Research (CAHR 2018).

As happens each year, those working in all disciplines of HIV/AIDS research, as well as policy makers, persons living with HIV and other individuals committed to ending the pandemic, will come together in Vancouver to share the outcomes of new research, honour new investigators and acknowledge the achievements of major contributors to the field. CAHR 2018 will also allow us to formally pay tribute to HIV research pioneer Dr. Mark Wainberg, one of the founding members of CAHR as well as friend and mentor to many, whose ongoing commitment to the cause is sorely missed.

CAHR extends it gratitude and appreciation to the members of the 2018 Conference Scientific Committee for developing a strong program. In line with this year's theme of "Celebrating our Diversity: Uniting in the Response to HIV" we join together to hear new scientific knowledge and exchange ideas through structured and spontaneous dialogue on the major issues facing the global response to HIV.

CAHR is also pleased to highlight a number of changes that were developed in response to ideas put forward by the membership. It is our hope that these changes better align the Conference structure with the current needs of HIV/AIDS researchers in Canada and the face of the epidemic. Changes include: additional oral abstract sessions that will allow more cutting-edge research to be presented and a more dynamic Sunday program; a greater focus on key populations that will include a dedicated oral abstract session on Saturday; and waiving the registration fees for community members.

I hope you enjoy the Conference, find it to be a worthwhile learning experience, and are able to reconnect with old friends and colleagues while engaging new ones.

Dr. Curtis Cooper
CAHR President

Bienvenue au 27e Congrès annuel canadien de recherche sur le VIH/sida, de la part de l'Association canadienne de recherche sur le VIH (ACRV).

Comme chaque année, ceux qui œuvrent dans toutes les disciplines de la recherche sur le VIH/sida, ainsi que les responsables de la politique, les personnes vivant avec le VIH et autres personnes résolues à mettre fin à la pandémie se réuniront, cette année à Vancouver, pour mettre en commun les résultats des nouvelles recherches, rendre hommage aux nouveaux chercheurs et reconnaître les réalisations des principaux contributeurs du domaine. L'ACRV 2018 nous permettra également de rendre officiellement hommage à ce pionnier de la recherche sur le VIH qu'est le Dr Mark Wainberg, l'un des grands fondateurs de l'ACRV et ami et mentor de nombre d'entre nous, dont l'engagement constant à la cause nous manque durement.

L'ACRV exprime sa reconnaissance et son appréciation aux membres du comité de planification du Congrès 2018, qui a élaboré un excellent programme. Dans l'optique du thème de cette année, qui est « Célébrons notre diversité : Unis en réponse au VIH », nous nous rassemblons pour entendre parler de connaissances scientifiques nouvelles et échanger des idées dans le cadre de dialogues structurés ou spontanés sur les grands enjeux de la réponse mondiale au VIH.

L'ACRV a également le plaisir de souligner un certain nombre de modifications apportées en réponse aux idées présentées par les membres. Nous espérons que ces modifications offriront une meilleure correspondance entre la structure du congrès et les besoins actuels des chercheurs du domaine du VIH/sida au Canada pour faire face à l'épidémie. Parmi les changements, mentionnons : un plus grand nombre de séances de présentations orales d'abrégés autorisant la diffusion de plus de sujets de recherche de pointe, et un programme du dimanche plus dynamique; un accent accru sur les populations clés, où il y aura une séance de présentation spéciale d'abrégés réservée spécialement le samedi; ajoutons aussi la renonciation aux frais d'inscription pour les membres de la collectivité.

J'espère que vous passerez un excellent congrès, que vous en retirerez une expérience d'apprentissage enrichissante et serez à même de renouer avec de vieux amis et collègues tout en vous en faisant de nouveaux.

Le président de l'ACRV,
Dre Curtis Cooper

Message from the Conference Co-Chairs / Message des coprésidents du congrès

It is with great pleasure that we welcome you to Vancouver, also known as "the best place on earth" for CAHR 2018. We also wish to acknowledge that we are on the unceded territory of the Musqueam, Squamish and Tsleil-Waututh First Nations.

This year is the 27th edition of the conference, and we think it is timely that two women are co-chairing CAHR for the first time. We all know that HIV takes no prisoners, and affects people indiscriminately of age, race or gender. Together we have made great strides, both on the prevention and treatment fronts. There are now close to 20 million people accessing antiretroviral treatment. Pre-exposure prophylaxis antiretroviral therapy are preventing new infections, and we are getting closer in our search for an effective vaccine, and a cure. Over the past decades, the face of HIV research has also evolved. More than ever, members of the community and key affected populations are integral to the research taking place. At CAHR 2018, we endeavour to acknowledge and celebrate diversity among people with lived experience of HIV, and among HIV researchers. In this quest against HIV, we have learned that we can accomplish more when we work together, when we embrace our diverse experiences, perspectives, and ideas; hence our conference theme this year: Celebrating our Diversity: Uniting in the Response to HIV.

In this spirit, this year will see a full oral session on Sunday morning, and we are introducing a new 5th oral session on Saturday morning. This session will be interdisciplinary across all four tracks, and focused on four key populations affected by HIV. These program changes may be maintained in future years so we would really welcome your feedback. In addition to our plenaries, we will also hold special sessions on a diversity of research topics; there will be something for everyone.

We wish to thank all the members of the scientific planning committee for their hard work preparing for this conference, and all those who contributed to reviewing abstracts and scholarship applications. Congratulations to all the academic and community scholarship recipients.

We hope that CAHR 2018 will provide learning and sharing opportunities, and inspire your future research endeavours. And let's not forget to have fun over the next 3 days.

Dr. Hélène Côté

Dr. Melanie Murray

C'est avec plaisir que nous vous accueillons à Vancouver pour l'ACRV 2018. Certains disent que c'est « le meilleur endroit sur Terre ». Nous souhaitons aussi souligner que nous nous réunissons sur le territoire non cédé des Premières Nations Musqueam, Squamish et Tsleil-Waututh.

Cette année marque la 27e édition du congrès et nous croyons qu'il est opportun que deux femmes soient coprésidentes du congrès pour la première fois. Nous savons tous que le VIH ne fait pas de prisonniers et frappe sans discrimination. Nous avons accompli ensemble de grands progrès, sur les plans tant de la prévention que du traitement. Près de 20 millions de personnes ont maintenant accès à des traitements antirétroviraux. La prophylaxie préexposition et la thérapie antirétrovirale empêchent les nouvelles infections et nos recherches nous rapprochent de la réalisation d'un vaccin efficace et d'une cure. Au cours des décennies écoulées, l'univers de la recherche sur le VIH a également évolué. Plus que jamais, les membres de la communauté et les principales populations affectées font partie intégrante de la recherche en cours. À l'ACRV 2018, nous voulons reconnaitre et celebrer la diversité au sein des gens qui ont une expérience vécue du VIH ainsi que des chercheurs du VIH. Dans cette croisade contre le VIH, nous avons appris que nous progressons davantage en travaillant ensemble, lorsque nous intégrons la diversité de nos expériences, points de vue et idées. Voici donc le thème du congrès de cette année : Célébrons notre diversité : Unis en réponse au VIH.

Dans cet esprit, dans l'édition de cette année, nous ajoutons le dimanche matin une séance complète de présentation orale d'abrégés et introduisons pour le samedi matin une cinquième séance orale de présentation d'abrégés : il s'agira d'une séance interdisciplinaire couvrant les quatre volets et axée sur quatre populations clés affectées par le VIH. Ces changements au programme pourraient être conservés dans les années qui viennent et, de la sorte, nous souhaitons vraiment recevoir vos opinions. En plus des plénières, nous tiendrons aussi des séances spéciales sur divers thèmes de recherche. Il y en aura pour tout le monde.

Nous souhaitons adresser nos remerciements à tous les membres du comité de planification scientifique, qui ont durement travaillé pour préparer ce congrès, ainsi qu'à toutes les personnes qui ont contribué à évaluer les abrégés et les demandes de bourses. Nos félicitations à tous les lauréats de bourses communautaires et académiques.

Nous espérons que vous trouverez à l'ACRV 2018 nombre d'occasions d'apprentissage et de partage qui inspireront votre recherche. Et n'oubliez pas, au cours des trois prochains jours, de trouver le temps d'avoir du plaisir!

Dr. Hélène Côté

Dr. Melanie Murray

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KP1.02

Impact of HIV Infection and MSM Status on Rectal Microbiome and Cytokine Profiles in Kenyan Men

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Background: The rectal microbiome plays an important role in regulating mucosal immunity at that site, which may have implications for rectal HIV acquisition in men. Both HIV infection and MSM status have been linked to altered gut microflora, but to date very few studies have been carried out in Africa.

Methods: A cross-sectional study was conducted to characterize the microbial and immunological environment of the rectum in a sample of MSM and straight men from Nairobi, Kenya. The microbiome was characterized pre- (fecal) and post- (mucosal) enema using 16 srRNA sequencing. Data were analyzed using the QIIME Greengenes software package. Concentrations of 37 inflammatory cytokines were analyzed using multiplex immunoassays from rectal mucosal fluid collected post-enema.

Results: Samples were obtained from participants comprising three study groups: HIV- MSM (n=39), HIV+ MSM (n=23), and HIV- non-MSM (n=15). Four microbiome clusters were defined using unsupervised hierarchical clustering: *Prevotella* cluster 1, *Bacteroides* or *Enterobacteriaceas*-dominant, *Prevotella* cluster 2 and an unspecified cluster. These groups were correlated between fecal and rectal specimens. The combination of *Bacteroides*-dominant and unspecified clusters were more common in HIV+ MSM (73%) and HIV- MSM (66%) while relatively uncommon in non-MSM (13%), In contrast, *Prevotella* cluster 1 dominated the non-MSM (60% vs 15% and 13% in HIV- and HIV+ MSM) mucosal samples (chi-squared p=0.01). HIV+ MSM had decreased alpha diversity compared to the other groups for both fecal (p=0.01) and mucosal (p=0.07) microbiomes. Cytokines levels were similar in both the HIV- and HIV+ MSM but the non-MSM had elevated levels of IL-8, LIGHT, MMP-2, MMP-3, and decreased levels of IFN-B and TWEAK ($p<0.05$).

Conclusions: MSM status was associated with significant alterations to the rectal microbial and immune milieu, potentially mediated through anal sex (though other causes are possible). Future work could determine whether rectal microbiome and cytokine concentrations impact HIV susceptibility.

EPH1.05

This abstract has been withdrawn

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Oral Presentations – Exposés oraux

Basic Sciences: Cure, Latency, Reservoirs

Sciences fondamentales : Cure, latence, réservoirs

BS1.01

HIV-Infected Macrophages are Selectively Infected and Killed by the Oncolytic Rhabdovirus, MG1; a Potential Tool for Viral Eradication

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Introduction: Impairment of the type 1 interferon (IFN1) response is observed during HIV infection and has the potential to be exploited for therapeutic benefit. For example, oncolytic viruses, such as the recombinant Maraba virus, MG1, have been designed to selectively kill cancer cells with defective IFN1 signalling. MG1 may therefore be a useful strategy for the eradication of HIV-infected macrophages, an important cellular reservoir for HIV *in vivo*.

Hypothesis: IFN1 responses are impaired within HIV-infected macrophages, and serve as a target for MG1-mediated infection and killing.

Methods: Monocyte-derived macrophages (MDM) differentiated from healthy donor PBMC were infected with HIV NL4-3 BAL-IRES-HSA. Alveolar macrophages (AM) were isolated from bronchoalveolar lavage from HIV-infected individuals on suppressive ART for ≥3yr. IFNα or 5'ppp dsRNA-induced IFN-stimulated gene (ISG) expression was measured in MDM by flow cytometry. Following MG1 infection, Annexin-V staining and Caspase 3/7 activation were measured in MDM by flow cytometry, while proviral HIV DNA was measured in MDM or AM by PCR.

Results: IFNα- and 5'ppp dsRNA-induced expression of two ISGs (PKR and ISG15) was lower in HIV-infected (HSA^+) MDM, in comparison to uninfected cells. Following MG1 infection, Annexin-V staining and Caspase 3/7 activation were significantly greater in HSA^+ MDM than uninfected MDM. This was paralleled by a decrease in proviral HIV DNA in both MDM and AM cultures. Importantly, these effects were not observed with UV-inactivated MG.

Conclusion: Altered IFN1 signalling in HIV-infected MDM was found to be associated with preferential infection and killing by replication-competent, but not UV-inactivated, MG1. This was confirmed *ex vivo* using AM from HIV-infected individuals. These findings complement recent observations in latently-infected $CD4^+$ T cells and support MG1 as a novel approach to eradicate the macrophage-based HIV reservoir. As MG1 is currently being used in cancer clinical trials, clinical trials in HIV-infected individuals may be warranted.

BS1.02

Caspase Inhibitor Prevents AIDS Disease Progression in SIV-infected Rhesus Macaques

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Apoptosis has been proposed as a key mechanism responsible for CD4 T cell depletion and immune dysfunction during HIV infection. We demonstrated that a broad caspase inhibitor, inhibits spontaneous and activation-induced cell death of T cells from SIV-infected rhesus macaques (RMs). When administered during the acute phase of infection, this treatment was associated with (i) reduced levels of T cell death, (ii) preservation of CD4/CD8 T cell ratio in lymphoid organs and in the gut, (iii) maintenance of memory CD4 T cells, and (iv) increase specific CD4 T cell response associated with the expression of cytotoxic molecules. Although therapy was limited to the acute phase of infection, RMs showed lower levels of both viral load and cell-associated SIV-DNA as compared to control SIV-infected RMs throughout the chronic phase of infection, and prevented the development of Aids. Overall our data demonstrate that caspase inhibitor injection in SIV-infected RMs may represent a novel adjunctive therapeutic agent to control HIV infection and delaying disease progression to AIDS.

BS1.03

HIV-1 Modulates Host Cell Metabolism by Controlling Late Endosome/Lysosome Positioning and Motility

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The major barrier to the eradication of HIV-1 is the elimination of viral reservoirs, the establishment and maintenance of which have been shown to be dependent on mammalian target of rapamycin (mTOR) complexes (C)1 and C2. mTORC1 serves as the cell's major metabolic hub that

couples nutrient sensing to cellular homeostasis and is the main regulator of autophagy, a catabolic process critical for cell maintenance. The effects of HIV-1 on autophagy during infection are complex and depend on the cell type and on the status of the cell, but collectively contribute to viral persistence and immune evasion. In previous studies, we showed that HIV-1 activates mTORC1 and promotes late endosome/lysosome (LE/Lys) repositioning, two key mechanisms that directly regulate autophagy. In this work, we further investigate the molecular mechanisms of the HIV-1-mediated modulation of autophagy. Using a combination of pH-sensitive lysosomal dyes and high-resolution confocal microscopy in live cells, we show that HIV-1 generates a cellular environment that resists autophagy induced by various stressors including oxidative stress and starvation. We also provide evidence that HIV-1 hinders LE/Lys acidification resulting in a defect in LE/Lys degradative activity and motility. We then demonstrate that, upon disruption of LE/Lys trafficking, HIV-1 loses its ability to prevent autophagy suggesting that HIV-1 depends on its ability to commandeer LE/Lys to inhibit autophagy. Furthermore, by inducing autophagy with the IMPase inhibitor lithium chloride, HIV-1's ability to inhibit autophagy was supressed and as a consequence viral replication was drastically reduced. To conclude, a greater understanding of HIV-1's ability to commandeer mTOR, LE/Lys positioning and the repercussions on autophagy and host cell metabolism will provide new insights in the development of a functional cure for HIV-1.

BS1.04

Genetic Diversity and CTL Escape Burden in the Replication-Competent HIV Reservoir in Youth in a Therapeutic HIV Vaccine Trial

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Background: Genetic diversity and immune escape within the replication-competent HIV reservoir are barriers to cure. Knowledge of these parameters remains incomplete, particularly among adolescents. We quantify sequence diversity and inferred CTL escape mutation burden in HIV clones retrieved longitudinally from the resting CD4+ T-cell latent reservoir of youth enrolled in a therapeutic HIV vaccine trial (PACTG/IMPAACT-P1059:MVA-HIV prime/Fowlpox-HIV boost). We additionally investigate possible vaccine-induced alterations in reservoir composition using genetic/phylogenetic methods.

Methods: Partial Pol (N=204) and Nef (N=185) sequences from 4 perinatally-infected and 9 nonperinatally-infected youth were isolated from latent reservoir clones sampled at up to 9 timepoints over 72 weeks (up to 2 and 7 timepoints pre- and post-vaccination respectively). Participants maintained pVL<50 copies/ml on ART during follow-up. Vaccine-induced perturbations in reservoir composition were investigated by testing within-host HIV phylogenies for molecular clock signal and assessing HIV temporal sequence compartmentalization. Inferred escape mutations were defined using published HLA-associated polymorphisms lists.

Results: A median 15 Pol and 14 Nef sequences were isolated per participant. Perinatally-infected participants exhibited greater Pol genetic diversity than nonperinatally-infected participants (median 9.6% vs 1.8% Pol codons exhibiting nonsynonymous variation, p=0.016; median tip-to-tip phylogenetic distance $2.1e^{-2}$ vs $3.6e^{-3}$ nucleotide substitutions/site, p=0.0091). Nef displayed similar trends. Perinatally-infected participants also trended towards higher inferred escape burden in Pol (median ~26.7% vs. ~12.5% respectively, p=0.3), though not in Nef. Most participants also exhibited at least one HLA-restricted CTL epitope where susceptible and escaped forms co-existed within their reservoir. Three participants displayed potential within-host evolution and/or possible vaccine-induced selection of certain HIV lineages.

Conclusion: Reservoir diversity was higher in perinatally-infected youth, particularly in Pol, consistent with reservoir diversity increasing with infection time. Results suggest the vaccine may have perturbed reservoir composition in a minority of participants. Vaccine-based strategies to clear the latent reservoir in HIV-infected youth should consider reservoir genetic complexity.

BS1.05

Correlates of Within-host Genetic Diversity of the Latent HIV-1 Reservoir in PBMC

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Background: HIV-1 latency is the main barrier to cure, but our understanding of within-host latent reservoir diversity remains incomplete. We characterize genetic diversity, inferred immune escape burden and immune correlates thereof, in PBMC-derived HIV-1 proviral DNA sequences isolated from individuals with prolonged viremia suppression on cART.

Methods: HIV-1 proviral Nef sequences were isolated from PBMC by single-genome amplification in 8 infected individuals who maintained viremia suppression for

>6 months. Within-host phylogenies were inferred by maximum-likelihood (RAxML). HLA class I typing was performed by sequencing; adaptation of within-host Nef sequences to host HLA pressures was estimated using published reference lists of HLA-associated polymorphisms defined at the population level. Total and integrated HIV DNA was measured by qPCR; immune parameters were measured by flow cytometry.

Results: 234 single-genome-amplified Nef sequences were isolated; 214 (91.6%) were intact/non-hypermutated (median=24, IQR=21-33 sequences/participant). Within-host HIV-1 proviral diversity varied markedly: for some, a single variant dominated while in others, diversity was substantial. Within-host datasets differed at a mean 13.2% (range 0-26.1%) Nef codons; phylogenies measured a mean height of $2.88e^{-2}$ nucleotide substitutions/site (SD=$1.87e^{-2}$) and mean patristic distances of $2.00e^{-2}$ (SD=$3.53e^{-2}$). Reservoir size and diversity correlated positively (e.g. Spearman rho=0.77 for tree height vs. total DNA; rho=0.66 for mean patristic distance vs. total DNA). On average, 50% (range 35.3%-70.8%) of HLA-associated sites harbored the published adapted (inferred immune escape) form; instances where susceptible and escaped variants of the same HLA-restricted epitope co-existed in an individual's reservoir were noted. Reservoir diversity correlated strongly with various immune parameters including % CD4+ central memory cells (rho=0.8); % CD4+ CD38+ HLA-DR+ cells (rho=0.8) and % CD8 central memory cells (rho=1).

Conclusions: Latent HIV-1 proviral diversity and escape burden varies widely between individuals; larger reservoirs tend to be more diverse. The relationship between reservoir size and immune profiles merits further investigation.

BS1.06

Mucosal T-Cells as Potential Cellular Reservoirs of HIV Within the Lungs of Virally Suppressed HIV-infected Adults Under Long-term ART

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Background: The lungs are anatomical HIV reservoirs that remain relatively understudied in the ART era. Meanwhile, peripheral blood $CCR6^+$ and $CD32a^+$ CD4 T-cells, and double negative (DN) $CD4^-CD8^-$ T-cells were identified as potential cellular reservoirs. Here, we assessed their frequency and distribution in the lungs compared to peripheral blood of HIV-infected adults under long-term suppressive ART.

Methods: Twenty HIV^+ individuals without respiratory symptoms and under long-term suppressive ART (suppressed viral load and CD4 T-cell count >350 cells/mm^3 for ≥3 years) underwent bronchoscopies to obtain bronchoalveolar lavage (BAL) fluid, and matched peripheral blood was drawn. Cells were characterized by flow cytometry, and total and integrated HIV DNA were measured by ultrasensitive PCR.

Results: Greater levels of HIV DNA were observed in BAL cells compared to PBMCs. A significant increase in memory $CCR6^+$ CD4 T-cells and its subsets Th1/Th17 and $CCR6^+CCR4^-CXCR3^+$ CD4 T-cells were found within the lungs *vs* blood. Interestingly, an enrichment in CD4 T-cells expressing the Fc receptor CD32a was observed in pulmonary mucosal cells *vs* blood. Pulmonary CD32a+ CD4 T-cells were characterized by higher levels of HLA-DR and CCR5 compared to their circulating counterparts. Moreover, memory $CCR6^+$ CD4 T-cells and DN T-cells exhibited higher expression of CD32a in the lungs compared to blood. In addition, higher frequencies of DN T-cells were observed in the lungs *vs* blood. Finally, an important increase in effector memory CD4-T-cells as well as higher levels of immune activation and immuno-senescence of CD4 T-cells within the lungs have been observed compared to PBMCs.

Conclusion: In virally suppressed HIV^+ adults, the lungs harbor higher levels of HIV DNA and greater frequencies of T-cell subsets identified as preferential cellular HIV reservoirs compared to blood. The distinct distribution of pulmonary mucosal T-cells could contribute to the preferential persistence of viral reservoirs within the lungs.

Clinical Sciences: Co-infections and Syndemics

Sciences cliniques : Coinfections et syndémique

CS1.01

Non-vaccine Oncogenic HPV Persistence Among HPV-vaccinated Women Living with HIV

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Objectives: To assess rates of incident persistent infection with non-quadrivalent HPV (qHPV, i.e. HPV6/11/16/18) oncogenic HPV types in our cohort of qHPV-vaccinated women living with HIV (WLWH).

Methods: WLWH were scheduled to receive three doses of qHPV vaccine in a multi-centre study. Participants provided health data and HPV DNA samples tested by Linear array assay. Persistent cases of HPV were defined as new HPV in samples from ≥2 consecutive visits or as HPV present in the last sample. Participants had to be DNA negative for the relevant HPV type at screening and baseline. HPV31/33/35/39/45/51/52/56/58/59/68/82 were considered because they may have oncogenic potential. HPV31/33/45/52/58 are contained within the nonavalent vaccine. Median follow-up time was 4 years post initial vaccine dose.

Results: 284 participants were eligible for this analysis with 1205 person-years (PY) of follow-up (≥1 dose of vaccine, ≥1 HPV DNA result post-vaccination), reflecting an intention-to-treat population. At baseline, median age was 38 years (IQR: 32-44), median CD4 count was 499 cells/mm^3 (IQR: 375-680), median CD4 nadir was 230 cells/mm^3 (IQR: 120-338), and 71% had a suppressed HIV viral load (<50 copies/mL). The highest incidence of persistent infection was with HPV51 (1.38/100PY), followed by HPV52 (1.18/100PY), and HPV39 (1.06/100PY).

Non-Quadrivalent Oncogenic HPV Persistence

HPV type	Incidence Rate /100PY	95% Confidence Interval
31	0.17	0.02-0.63
33	0.17	0.02-0.62
35	0.73	0.31-1.43
39	1.06	0.55-1.86
45	0.91	0.43-1.67
51	1.38	0.77-2.28
52	1.18	0.61-2.06
56	0.63	0.25-1.30
58	0.64	0.26-1.31
59	0.44	0.14-1.03
68	0.43	0.14-1.02
82	0.43	0.14-1.00

Conclusions: qHPV-vaccinated WLWH continue to face a burden of persistent oncogenic HPV infection. While the nonavalent vaccine could alleviate some of this burden, two of the top 3 persistent oncogenic HPVs in this cohort are not contained within any available vaccine. This highlights the need for ongoing cervical screening in HPV-vaccinated WLWH.

CS1.02

Accuracy and Acceptability of Self- Versus Clinician-Collected Anal Swabs for Cytology in HIV-Positive Men: Preliminary Results from the NOMAD-2 Study

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Background: Anal cancer is one of the most common cancers in those living with HIV. HIV-positive men who have sex with men (MSM) have rates 50-100 times higher than the general population. These alarming trends, coupled with a paucity of evidence surrounding how best to approach anal cancer screening, highlight the importance of novel methods to screen for this malignancy. The objective of this study was to compare the accuracy and acceptability of self- versus clinician-collected swabs for anal cytology.

Methods: Participants for this cross-sectional study were recruited from a specialty HIV clinic in Hamilton, Canada. Participants were randomised to one of two arms depending on the order in which the swabs were performed: clinician then self, or self then clinician. Participants were provided with an instruction card for self-collection. Swabs were then sent for anal cytology, as per the Bethesda classification. The primary outcome was adequacy of the sample.

Results: Preliminary results for 71/96 HIV-positive MSM with median age 52 (IQR: 41, 57) were analyzed. Mean CD4 count was 735x10^6/L (IQR: 110-1870 x10^6/L) and 93% had suppressed HIV viral load. Of the self-collected samples, 92% were adequate for cytology, and 92% of the clinician-collected samples were adequate. Inter-rater reliability for sample adequacy between self- and clinician-collected samples (n=71) showed a percent agreement of 89%, a percent positive agreement of 94%, and a kappa estimate of 0.27 (95%CI: 0.04-0.50). Most participants found the self-collected swabs comfortable (76%), easy to perform (87%), and stated they would be comfortable doing self-collection again (87%).

Conclusions: These data demonstrate that there is no difference in sample adequacy between self-versus clinician-collected samples for anal cytology, suggesting this to be a feasible method to consider for anal cancer screening in MSM living with HIV. Participants also overwhelmingly found this to be an acceptable intervention.

CS1.03

Early Acceptability and Cytologic Outcomes of Anal Cancer Screening in Men Who Have Sex with Men (MSM) Living With HIV: The HPV-SAVE Study

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Background: Human papillomavirus (HPV)-associated anal cancer is emerging as a leading cause of non-HIV-related death in HIV-positive MSM. Anal cancer rates in HIV-positive MSM are up to 100-times higher than the general population. There are no universally-accepted guidelines for anal cancer screening, even in high risk populations, due to a paucity of evidence to support its effectiveness. As such, there is no public funding and little promotion of anal cancer screening. We assessed the acceptance rate to invitations for anal cancer screening, and describe preliminary cytology results.

Methods: The HPV-SAVE Study is an ongoing study on screening and treatment of anal cancers and pre-cancers in HIV-positive MSM. We invited HIV-positive MSM in Toronto, Vancouver and Ottawa to have anal cytology (Pap) testing in their physician's office. Those with abnormal Pap tests were referred for high resolution anoscopy (HRA) and anal biopsy. Descriptive statistics for invitation acceptance and cytology results, as well as preliminary estimates of the sensitivity and specificity of high-grade (HSIL) cytology for high-grade histology are presented.

Results: Out of 1846 invitations as of 12/2017, 496 men (26.9%) agreed to be screened. Median age is 47 years (interquartile range, 37-58), and 85% had undetectable HIV viral load. Cytology results from 449 satisfactory Pap tests were: 210 negative (46.8%), 150 ASCUS (33.4%), 63 LSIL (14.0%), 26 HSIL (5.8%). Of 83 participants referred for HRA, 43 (51.8%) had high-grade histology. The probability of high-grade histology increased with progressively higher grade cytology (LSIL: 61% vs. HSIL: 85%; p = 0.04). Sensitivity and specificity of HSIL in predicting high-grade histology was 47% and 86%, respectively.

Conclusions: HIV-positive MSM had moderate acceptance of invitations to have anal cancer testing, with a majority of screened men having abnormal cytology. High grade cytology (HSIL) was specific for detection of pre-cancerous anal histology.

CS1.04

HIV Infection Associated with Sharing Injection Drug Preparation Equipment in London, Ontario

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Background: London, Canada is in the midst of a HIV outbreak amongst People Who Inject Drugs (PWID), despite a very extensive needle and equipment distribution campaign, opioid substitution program, and local HIV clinic. Hydromorphone hydrochloride time-release capsules (HMC)(Hydromorph Contin®) is a controlled release opioid, and is commonly used by people who inject drugs in London. Injection of HMC is associated with sharing of injection drug preparation equipment (IDPE) such as filters and cookers.

Methods: We conducted a nested case control study of local PWID to elucidate risk factors for HIV transmission. Cases (HIV+) (n=35) and controls (HIV-)(n=84) completed an extensive questionnaire regarding attitudes and behaviors associated with injection drug use. We assessed the presence of residual HMC or immediate release hydromorphone (IRH) in the IDPE following initial injection, and the effects of heating the preparation using liquid chromatography–tandem mass spectrometry. Persistence of HIV reverse transcriptase activity (RT) and infectivity was assessed after adding virus to IDPE in the presence or absence of HMC or IRH.

Results: Logistic regression analysis demonstrated that sharing IDPE in the absence of needle/syringe (NS) sharing was strongly associated with HIV infection [aOR=22.12; p<0.001], with no association with sharing only NS [aOR=0.91; p=0.92]. Following initial injection, 45% of HMC (but not IRH) remained in the IDPE with no change to the quantity of extracted or residual hydromorphone after heating. HIV RT activity and infectivity were preserved in the IDPE by the presence of HMC but not IRH. Heating the IDPE rapidly inactivated HIV.

Conclusion: We demonstrated a high risk for HIV transmission associated with sharing of IDPE. Time released hydromorphone encourage IDPE sharing, and the drug excipients preserve HIV viability. Heating IDPE may be a viable harm reduction strategy.

CS1.05

Syndemic Service Integration: are STBBI Clinics Appropriate Settings for Addressing Population Health Inequities in Access to Mental Health Services?

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Background: HIV, other sexually transmitted and blood-borne infections (STBBI), and mental health and substance misuse problems co-occur at elevated rates in particular communities—e.g., sexual and gender minorities—due to socio-structural processes of discrimination, exclusion, and segregation. These overlapping epidemics, or 'syndemics', are exacerbated by challenges these same communities face in accessing culturally-safe and sexual/gender minority-affirming mental health services. Many publicly funded STBBI clinics are low-barrier (non-nominal and free of cost) and provide sexual and gender minority-competent care. These sites therefore may be uniquely situated to address inequities in mental health service access.

Methods: We conducted a waiting room survey at six urban and suburban STBBI clinics in Metro Vancouver, between November 2016 and July 2017, in order to characterize clients' needs, barriers, and interest in mental health services.

Results: A total of 1,115 clients responded to the survey; 65% were sexual minorities, and 2% were gender minorities. Overall, 39% reported a current need for mental health support, particularly with respect to depression (26%), anxiety (29%), substance use (10%), or suicide ideation (7%), but 72% of this group had not yet talked to a healthcare provider about their concern. Sexual and gender minorities were more likely than cisgender heterosexual respondents to report a barrier to accessing mental health services. 88% of clients indicated they were comfortable discussing mental health concerns with an STBBI clinic nurse or physician. By comparison, 70% were comfortable talking to a family doctor, though 42% of clients do not have a regular doctor.

Conclusions: STBBI clinics may be opportune sites for assessing and referring clients affected by 'syndemic'-related drivers of STBBI to mental health services. Interviews with STBBI clinic providers and administrators are planned for early 2018, with the aim of building on survey results to identify and recommend future interventions.

CS1.06

High-dose Opioid Analgesic Regimens Among People Living with HIV in British Columbia, Canada

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Background: Opioid analgesics are associated with various health harms, including overdose and mortality. As people living with HIV (PLHIV) may experience acute or chronic pain for which opioid medications may be prescribed, these individuals are particularly vulnerable to opioid-related harms. This study aimed to identify demographic and clinical characteristics associated with being prescribed high-dose opioid analgesics among PLHIV in British Columbia (BC).

Methods: We used a comprehensive linked population-level database of PLHIV in BC to construct bivariable and multivariable generalized estimating equation models on factors associated with being prescribed high-dose opioid analgesics, defined as >90 daily morphine milligram equivalents (MME/d).

Results: Among PLHIV who were prescribed opioids between 1996 and 2015 (n=10,780), 27.1% received prescriptions of >90 MME/d at least once during the study period. Factors positively associated with >90MME/d included: having received a co-prescription of benzodiazepines (adjusted odds ratio [AOR] = 1.36; 95% confidence interval: 1.29– 1.43); presence of an Acquired Immune Deficiency Syndrome (AIDS) defining illness (ADI; AOR = 1.64; 95%CI: 1.40 – 1.93); seen by an HIV specialist (AOR = 1.22; 95%CI: 1.15 – 1.30); HIV viral load of >5.00 log10 copies (AOR = 1.14; 95%CI: 1.03 – 1.25); substance use disorder (AOR = 1.45; 95%CI: 1.3 – 1.72); and calendar year (AOR = 1.11; 95%CI: 1.09 – 1.12).

Conclusion: Our findings indicate that individuals with advanced HIV infection or the presence of a substance use disorder were more likely to be prescribed high-dose opioid analgesics. Furthermore, those who were co-prescribed benzodiazepines and those who were seen by an HIV specialist were also more likely to be prescribed high-dose MME/d. Given the known risks associated with high-dose opioid prescribing, future research efforts should focus on the clinical indication and outcomes associated with these prescribing practices.

Epidemiology and Public Health: Epidemiology and Public Heath

Épidémiologie et santé publique : Épidémiologie et santé publique

EPH1.01

Determinants of Mortality Within a Prospective Clinical Cohort of People Living with HIV in Manitoba

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Introduction: In an ongoing effort to better understand and characterise HIV epidemiology in the province, the Manitoba HIV Program (MHP) has developed a clinical cohort of people in HIV care. Our objective was to assess determinants of mortality among MHP participants.

Methods: In total, 856 participants were included in analyses. To have one full year of data, participants were excluded if program entry was later than September 30, 2016. Socio-demographic and clinical determinants of mortality were examined using multivariable Cox regression models. Adjusted hazard ratios (AHR) and their 95% confidence intervals (95%CI) are reported.

Results: Median follow-up time was 8.7 years. Overall, 173 participants died between Jan-2008 and Sept-2016; 69.9% were male. Median age at death was 42 years (IQR:33-49years). Most deceased participants survived >10 years post-program entry, but 10% (*n*=19) died within one-year. Two-thirds (67.0%; *n*=116) of deceased participants entered care with CD4 count ≤350cells/mm^3 and 86.7% (*n*=150) started treatment post-diagnosis. Median CD4 count prior to death was 279cells/mm^3 (IQR:101-496cells/μL). After adjustment, risk of mortality was seven-fold greater among participants off-treatment at time of death (AHR=7.6, 95%CI:4.7-12.4), and three-fold greater for participants entering care with CD4 counts <100cells/mm^3 than for those with >500 cells/mm^3 (AHR=3.3, 95%CI:2.0-5.6). Compared to participants reporting heterosexual sex as primary HIV exposure, mortality was significantly greater among those reporting injection drug use (AHR=1.8, 95%CI:1.3-2.6), and lower among men reporting sex with men (AHR=0.51, 95%CI:0.3-0.8).

Discussion: Our findings reiterate the importance of early HIV diagnosis, rapid linkage to care, and prompt treatment initiation—lending additional weight to previously recommended policies in Manitoba. Efforts to normalize and expand HIV testing must continue across the province and treatment should be unconditionally available to all Manitobans living with HIV. Additionally, research into, and implementation of context-specific, community-informed strategies for supporting engagement in HIV care must be prioritised in Manitoba.

EPH1.02

Attributable Risk of Mortality Associated with Smoking and Chronic Diseases Among People Receiving ART in British Columbia

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Background: We measured the attributable risk of mortality associated with smoking and chronic diseases among PLWH receiving ART in BC.

Methods: We analyzed data from Clinical Status Report Forms (CSRFs) sent to physicians of BC HIV Drug Treatment Program (DTP) patients between 17-Jun-2014 and 27-Sep-2016. Mortality was assessed through data linkages with the provincial vital statistics agency until 31-Dec-2016. Poisson regression models were constructed to estimate adjusted mortality rate ratios. Attributable mortality was calculated from the adjusted mortality rates.

Results: There were 2457 patients with at least one completed CSRF, representing 31% of DTP patients. Median age was 51 years, 78% were male and 86% had a viral load measurement <200 copies/mL. Among persons with reported smoking status, 43% were current smokers, 21% were former smokers, and 36% had never smoked. By completion of follow-up, 96/2457 (4%) had died.

At least one chronic condition was reported for 71% of DTP patients studied (see Table), with hepatitis C infection (reported for 32%), dependence on drugs (excluding alcohol or tobacco) (27%) and mood disorders (17%) being the most common. In multivariable modeling, current smoking (adjusted rate ratio [aRR] 3.45; 95% CI 1.57-7.58), dependence on drugs (aRR 1.62; 95% CI 1.01-2.59), and non-AIDS defining cancers (aRR 4.03; 95% CI 1.77-9.18) were all associated with increased mortality. Current smoking and non-AIDS-defining cancers attributed to 13.15 and 15.41 excess deaths per 100 person-years, respectively.

Conclusions: Among ART patients in BC, current smoking and non-AIDS-defining cancers are associated with the largest excess risk to mortality.

Variable	Univariate Analysis	Multivariate Analysis	Attributable Risk of Mortality (per 100 person-years)
	Unadjusted Rate Ratio (95% Confidence Interval	Adjusted Rate Ratio (95% Confidence Interval)	
Age (10 years)	1.38 (1.16, 1.64)	1.73 (1.36, 2.19)	N/A
Smoking Status			
Never	1.00	1.00	
Current	4.59 (2.16, 9.78)	3.45 (1.57, 7.58)	13.15
Former	1.48 (0.54, 4.09)	1.06 (0.38, 2.93)	
Unknown	5.46 (2.55, 11.72)	3.62 (1.66, 7.89)	14.02
Viral Load (Closest Value within 3 Months Before or After Time CSRF was Received)			
< 200 copies/mL	1.00	1.00	
≥ 200 copies/mL	2.50 (1.51, 4.17)	2.28 (1.21, 4.32)	12.72
Unknown	1.04 (0.38, 2.87)	0.48 (0.14, 1.64)	
CD4 (Closest Value within 3 Months Before or After Time CSRF was Received)			
≥500 cells/mm^3	1.00	1.00	
350-499 cells/mm_3	1.99 (1.09, 3.64)	1.78 (0.96, 3.29)	
200-349 cells/mm^3	3.50 (1.96, 6.24)	2.12 (1.18, 3.82)	5.53
< 200 cells/mm^3	4.46 (2.44, 8.16)	2.66 (1.36, 5.23)	8.23
Unknown	3.06 (1.52, 6.15)	3.75 (1.62, 8.66)	13.60
Adherence to ART in Year Prior to Time CSRF was Received			
≥95%	1.00	1.00	
<95%	2.12 (1.40, 3.21)	1.57 (0.99, 2.50)	
Unmeasurable	0.95 (0.42, 2.13)	1.20 (0.47, 3.06)	
Hepatitis C Test Result Positive			
No	1.00	1.00	
Yes	2.65 (1.70, 4.13)	1.38 (0.84, 2.24)	
Unknown	3.05 (0.72, 12.98)	3.99 (0.83, 19.10)	
Chronic Obstructive Lung Disease			
No or Unknown	1.00	1.00	
Yes	3.20 (1.98, 5.17)	1.61 (0.95, 2.72)	
Dependence on Substances other than Tobacco or Alcohol			
No or Unknown	1.00	1.00	
Yes	2.36 (1.58, 3.53)	1.62 (1.01, 2.59)	1.62 (1.01, 2.59)
Non-AIDS-Defining Cancer			
No or Unknown	1.00	1.00	
Yes	4.36 (2.09, 9.08)	4.03 (1.77, 9.18)	15.41

EPH1.03

Mortality Among Women Living with HIV Enrolled in Canada's Largest Community-based Cohort Study

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Background: Among people with HIV, life expectancy gains are not equitably distributed. We measured all-cause and correlates of mortality among women with HIV enrolled in the Canadian HIV Women's Sexual and Reproductive Health cohort (CHIWOS).

Methods: CHIWOS is Canada's largest community-based research study enrolling women with HIV (trans inclusive; ≥16y) in BC, Ontario, and Quebec. Participants complete a peer-administered baseline survey (2013-2015), with 18-month (Wave-2:2015- 2017), and 36-month (Wave-3:2017-ongoing) follow-up. Among 1,422 women enrolled and followed until December 1st, 2017, we determined incidence and cause of death via comprehensive study notification and follow-up procedures and via linkage to Vital Statistics (BC only). We used bivariable analyses to assess baseline correlates of mortality.

Results: Over the follow-up, 52 women died (crude mortality rate=3.7%; 95%CI:2.7%-4.8%), with significant differences by province (BC=7.0%; ON=2.8%; QC=2.0%; p<0.001) and ethnicity (Indigenous=6.6%; African/Caribbean/Black=1.0%; White=3.9%; Other ethnicities=3.9%; p<0.001). The crude mortality rate was 4.2 times higher than among the general population of women in BC/ON/QC (0.88%; 2012-2014).

Primary cause of death was unknown for most women (69%), followed by drug- or alcohol-related (12%), co-morbidities including cancer, Hepatitis C, and cardiovascular disease (13%), and HIV-related opportunistic infections (6%).

Baseline factors significantly (p< 0.05) associated with mortality included older age, Indigenous ancestry, personal income <$20,000, <highschool education, current drug use, sex work involvement, depression, violence, and poorer physical health-related quality-of-life. HIV treatment factors (i.e., ART use, VL, CD4) were not predictive of mortality.

Discussion: We found an alarmingly high mortality rate among a community-based cohort of women with HIV, most of whom were engaged in HIV care and receiving ART. Findings suggest that women are dying from marginalizing social and structural environments, mental health and addictions, and/or comorbidities. HIV care delivery models that address the social determinants of health,

mental health, and which integrate harm reduction services are urgently needed.

EPH1.04

Using Concept Mapping to Identify Challenges with Accessing and Paying for Medications Among People Living with HIV in Ontario, Canada

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Background: In Ontario, there is no universal access to antiretroviral therapy (ART) or other medications used outside of hospitals. As a result, the cost of recommended ART is prohibitive for some people living with HIV (PLHIV). We explored why PLHIV have difficulty accessing and paying for medication in Ontario.

Methods: Concept Mapping sessions were conducted in urban (Toronto and Ottawa) and semi-urban (Windsor and Thunder Bay) settings. Participants included PLHIV who were newly diagnosed or long-term survivors, immigrants, individuals from ethno-racial communities, and people who use drugs. Separate sessions were held with healthcare providers. During brainstorming, participants generated statements in response to "*People living with HIV need to take medication for HIV and other conditions. Some people with HIV have trouble getting and paying for prescription drugs because…*" Participants then sorted and rated the final list of statements and concept maps were generated.

Results: The majority of the 68 participants were White (49%) or African, Caribbean or Black (27%), taking 3+ medications (43%), and accessing medication through the Ontario Disability Support Program (54%) or Trillium (15%). Brainstorming generated 447 statements (consolidated into 79 final statements) which reflected treatment access issues related to: (i) drug formularies; (ii) application processes for government programs; (iii) a lack of awareness of access support programs; (iv) challenges with stigma from providers, communities, and family members; and (v) competing needs that make it difficult to pay for medication-associated costs. Participants in rural areas highlighted additional challenges related to access to doctors, medication stock in pharmacies, and mobility challenges. Sorting and rating data and the final concept map will be presented.

Discussion: PLHIV experience individual, systemic and structural-level barriers accessing and paying for their medications. Given that continuous access to ART is necessary for the benefits to be fully realized, policies that address these challenges are needed.

EPH1.05

High Resilience of Women Living with HIV with Psychosocial Enabling Factors: Implications for Practice

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Backgro[illegible]silience refers to an individual's positive adapt[illegible]n challenging situations and is critical to one's health and [illegible]ellbeing. We aim to assess how sociodemographic and other variables correlate with high resiliency levels among women living with HIV (WLWH).

Methods: We used a cross-sectional approach to assess resiliency of 1,415 WLWH (aged ≥16) enrolled in the Canadian HIV Women's Sexual and Reproductive Health Cohort Study (CHIWOS) from 2013 to 2015 in BC, Ontario and Quebec. Resiliency was measured using the RS10 Resiliency Scale (range=10-70) and dichotomized based on the median (RS10-score ≥64). We conducted univariate analyses and multivariable logistic regression for the outcome, high resilience (RS10-score ≥64).

Results: Women were ethnically diverse (22% Indigenous, 29% African/Caribbean/Black, 41% Caucasian, and 7% other ethnicities). Participants reported a high overall resiliency score with a mean of 62.17 (SD=8.07) and median of 64 (IQR=59-69). Multivariable analysis revealed that sociodemographic variables that correlated with higher resiliency included gender (trans women had higher resiliency than cis women [aOR=1.94; 95% CI=1.04, 3.64]) and place of residence (women in Quebec and BC had higher resiliency than women in Ontario, with those in Quebec having significantly higher levels [aOR=2.15; 95% CI=1.62, 2.86]). Variables enabling higher resilience included food security [aOR=1.70; 95% CI=1.34, 2.16], absence of mental health conditions [aOR=2.38; 95% CI=1.88, 3.02], non-binge drinking compared to binge drinking [aOR=1.54; 95% CI=1.12, 2.12] and no injection drug use (IDU) compared to current IDU [aOR=4.10; 95% CI=2.49, 6.75].

Conclusions: The overall resilience of WLWH was high in this cohort. Trans women reported higher resilience than cis women and this should be celebrated. Care providers could focus on enabling variables that would lead to higher resilience for this population, including supporting women to be food secure, promoting good mental health and assiting women with their substance use, with supportive harm reduction strategies.

EPH1.06

The Epidemiologic Consequences of Failing to Prevent HIV Among Young Female Sex Workers in Kenya and Ukraine: an Observational and Mathematical Modeling Study

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Background: In Kenya and Ukraine, the median age of entry into sex work is 15 years, but the average age of accessing HIV prevention programmes is 23-26 years. We estimated the extent to which sexually-acquired infections before age 24 and before programme engagement could undermine the potential impact of existing HIV programmes for female sex workers in Mombasa, Kenya and Dnipro, Ukraine.

Methods: We conducted a cross-sectional bio-behavioral survey 408 and 450 cis-female, young sex workers (YSW) age 14-24 in Mombasa and Dnipro respectively, in 2015. We used the survey and published data to develop and calibrate an age-stratified, deterministic model of heterosexual HIV transmission to capture the local epidemiological features of each region between 2010 and 2015. The model estimated the 10-year fraction of cumulative, onward HIV transmissions in the total population attributable to infections acquired by YSW aged 14-24 years and before programme access in each setting.

Results: The median time from first sex to self-identification as a sex worker was 2 years in Mombasa (IQR 1,3) and 3 years in Dnipro (IQR 2,4); a longer duration was associated with a higher HIV prevalence, irrespective of whether or not the first sexual encounter included an exchange of money ($p<0.05$). Only 26.0% and 24.5% of YSW had accessed programme services, with a censured rate of programme access of 0.21 and 0.30 per person-years in sex work in Mombasa and Dnipro respectively. In Mombasa and Dnipro respectively, the model projects that infections acquired by YSW before programme access could account for 24% (IQR, 21-30%) and 42% (IQR, 39-45%) of HIV infections in the wider community over the next 10 years.

Conclusion: A failure to meet the HIV prevention needs of YSW could undermine the potential impact of existing HIV programmes for female sex workers in two diverse epidemic contexts

Social Sciences: Living Well with HIV

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SS1.01

Giving Back is Receiving: The Role of Generativity in Successful Aging Among HIV-positive Older Adults

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Background: Older adults constitute an increasing proportion of those living with HIV. While research supports the importance of social support in aging well with HIV, little inquiry has investigated the importance of generativity or giving back as part of successful aging. This qualitative study aimed to understand the role of generativity in aging well with HIV.

Methods: Using a modified grounded theory approach, men and women 50 years and older were recruited in Toronto and Hamilton, Ontario. Inclusion criteria were age (50+), self-defined "aging well" with HIV, and ability to provide informed consent. Participants were recruited through ASOs, community and university based medical clinics and other community agencies. Thirty in-depth, semi-structured interviews were conducted between February-May 2013. Interviews were audio-recorded and transcribed verbatim. Open and focused coding were used to identify themes consistent throughout the transcripts. Major properties were finalized by consensus of all team members.

Results: The major category of generatively was supported by four properties, which comprised the act of giving back, and included: 1) Reciprocity; 2) Mentoring; 3) Pioneerism; and 4) Connecting through Volunteerism. Reciprocity or the exchange of time, energy and services was an important part of aging well. As the first cohort "growing old" with HIV, these individuals felt a call to nurture and guide younger people living with HIV. Individuals viewed themselves as pioneers having the greatest amount of lived experience with HIV. Volunteering was a primary vehicle for manifesting generativity.

Implications: Our results emphasize the importance of reciprocity, social exchange and sense of community among older individuals. They offer a historic perspective and commitment to the AIDS effort that can be used if acknowledged and nourished. Rather than seeing older adults living with HIV as only recipients of support they

can be viewed as sources of knowledge, skills and support for others.

SS1.02

Mâmawi wâhkôtowin: An Arts-Based Approach to Understanding Wellness and Living with HIV among Indigenous Women in Winnipeg, Canada (CHIWOS)

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Background: This project is part of a national cohort study (Canadian HIV Women's Sexual and Reproductive Health Cohort Study – CHIWOS) that aims to assess the availability, uptake and effect of women-centered HIV and AIDS services. The purpose of the Manitoba component is to inform development of services for Indigenous women living with HIV. This presentation will include: (1) the process of developing and implementing an arts- and ceremony-based approach to data and knowledge generation among Indigenous women living with HIV; (2) Ojibway Medicine Wheel teachings that provided the foundation for our arts-based process; and (3) Indigenous women's perceptions of health and/or being well, barriers to wellness, and experiences in accessing services.

Methods: Mâmawi wâhkôtowin (Cree for "community relations") is the name of the data and knowledge generation process and was derived through ceremony led by Carey Sinclair, Knowledge Keeper. Data generation was completed over two days. Day one: participants created a medicine wheel quilt, using words and images to express themselves. The creation of the quilt included ceremony, teachings from a Knowledge Keeper, collage, discussion, a feast and healing activities. Day two of the research process occurred three weeks later, allowing participants time for reflection. Day two included a feast, feedback and discussion on the process of creating and the meanings represented on the quilt. Relationship building, sharing, stories, teachings, and a quilt were notable outcomes of the two day process.

Results: The quilt will be on display at this presentation. Participants described wellness as communicating with and listening to others, learning from Elders, walking, and being out with family. Barriers to wellness include complex trauma, flawed systems, challenges to disclosing in relationships, and violence from men. Creative and Indigenous knowledge-informed approaches to data generation offer opportunities to expand on Western processes and can improve relationship building and understanding.

SS1.03

A Qualitative Longitudinal Study of Episodic Disability Experiences of Older Women Living with HIV

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Purpose: Increased longevity for those with access to antiretroviral therapy has resulted in the recognition of HIV as a chronic illness often accompanied by disability. Disability associated with HIV may be experienced as episodic in nature, characterized by unpredictable periods of good and ill health. Our aim was to examine the episodic disability experiences of older women living with HIV over time.

Method: We conducted a qualitative longitudinal study, involving semi-structured indepth interviews on four occasions over a 20 month time frame. Women, 50 years of age or older and living with HIV for greater than 6 years, were recruited from community HIV organizations in Southern Ontario. Participants were part of a larger study involving older men and women living with HIV. Inductive thematic analyses of the transcribed interviews were conducted cross-sectionally and longitudinally.

Results: Ten women ranging from 51-61 years of age (median: 54 years; IQR= 52-58) participated in this study, all of whom completed 4 interviews. Median time since diagnosis was 12.5 years (IQR=8.0-13.7). Two major themes emerged that related to the episodic nature of the women's disability. Women were *living with multiple and complex sources of uncertainty over time* including unpredictable health challenges, worrying about cognition, unreliable weather, fearing stigma and the effects of disclosure, maintaining secure housing and adequate finances and fulfilling gendered and family roles. Women described *strategies to deal with uncertainty over time* including withdrawing and limiting activities and engaging in meaningful activities.

Conclusions: The longitudinal study design highlighted the disabling effects of HIV in which unpredictable fluctuations in illness and health can result in uncertainty and worrying about the future. Environmental factors such as stigma and weather may put older women living with HIV at a greater risk for social isolation. Strategies to promote dealing with uncertainty and building resilience are warranted.

SS1.04

Peer Researcher Facilitators, Barriers, and Epistemology: a Bounded System Case Study

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Background: Peer researchers (PRs) are members of a population under study, who are frequently employed in Canadian HIV/AIDS research. Identifying PR facilitators and barriers is key to creating supportive work environments, and theoretically conceptualizing PRs is important as the relationship between a participant and the self could result in a performative interval risk (i.e., barrier to objective analysis). Therefore, we conducted a qualitative case study to answer: What motivates and challenges a sample of PRs, and how do they position themselves epistemologically on a single community-based participatory research study?

Methods: Post-professionalism theory informed a bounded system case study, whereby four PRs were conveniently sampled and interviewed. Questions covered benefits and challenges of a PR role, supports during the study period, how disagreements were managed, and recommendations for new PRs. Interviews were analyzed using grounded theory, as open coding determined themes followed by selective coding to identify statements that supported these findings. Validation and reliability strategies included peer debriefing, member checking, and thick description.

Results: Personal interest and community leadership were key motivations behind PR involvement; language barriers were the key challenge. Epistemological themes concerned insider-outsider identities and navigating multiple roles. One response regarding these tensions was "…is our interpretation about what participants say actually a reflection of what they're saying? Are we projecting, making up stories…or are we close to an approximation of the reality of their narratives?"

Conclusions: Multiple roles and shifting identifies caused a power disruption, which is complicated as PRs cannot separate themselves from their social location. Participants identified a performative interval risk by questioning whether they projected their selves rather than truly representing participant contributions. This tension requires that academic researchers recognize the personal and social investment that PRs make to a study. This presentation will discuss strategies to engage, support, and retain peer researchers.

SS1.05

Awakening Our Wisdom: Land-Based Healing in a Community of Indigenous Women

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Background: Indigenous people in Canada experience higher rates of HIV and hepatitis C. Indigenous communities have expressed the need for more culturally supportive healing programs. For many Indigenous people, connecting with the land is essential for promoting and supporting healing.

Methods: Two HIV/AIDS community organizations, one mainstream and one Indigenous-specific, serving women in BC, collaborated with an Indigenous-led research team to provide a peer- and Elder-led land-based gathering for Indigenous women with lived HIV and/or hepatitis C experience. The two organizations undertook retreat planning and programming, while the research team, including academic and peer research associates, had responsibility for the research. Both were overseen by committees with relevant expertise. Qualitative data was collected through sharing circles. Two sharing circles took place during the gathering (n=13), and one follow-up sharing circle 6 months after the gathering (n=6). Qualitative data were coded and thematically analyzed in NVivo 11.

Results: Participants spoke of what hinders and facilitates their wellness. Negative experiences in the healthcare system, especially when receiving HIV and/or hepatitis C care, were viewed as particularly detrimental to participants' wellness. While taking part in cultural practices was considered to facilitate wellness, participants described a lack of access to cultural practices, both within and outside the healthcare system. Participants spoke about the importance of building and maintaining relationships with other Indigenous women with similar lived experiences, and finding strength in these relationships. Finally, the participants said that connecting to the land is healing in and of itself.

Conclusion: There is a gap between what Indigenous women wish to experience in their healing journeys, and what is currently offered. There is a need and desire for ongoing, culturally supportive, land-based programs that bring Indigenous people together on a path towards wholistic healing.

SS1.06

A Place "I Feel is Home": The Meaning of Home and Health Outcomes for People Living with HIV/AIDS

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Background: Housing continues to be one of the most significant unmet needs for many people living with HIV/AIDS in British Columbia. While there has been a focus on documenting material aspects of housing and housing extremes (i.e., homelessness), there are important gaps in our understanding of the complex relationship between housing and health for people living with HIV/AIDS. The aim of this research was to illuminate the diversity of lived experiences, the variety of housing situations in Greater Vancouver (GV), and the ways in which people living with HIV/AIDS construct meanings of home.

Methods: Community-based research approaches were used to explore the variety of lived experiences across a continuum of housing situations, while promoting collaborative inquiry among community and academic research team members. For this analysis, a purposively selected sample of 10 transcripts was drawn from 53 semi-structured qualitative interviews with people living with HIV/AIDS in GV. Transcripts were analyzed using a grounded theory approach to explore how people constructed the meaning of home.

Results: The participants (5 Caucasians, 3 Indigenous persons, 1 Chinese-Canadian and 1 African refugee; 4 females, 1 trans-female, and 4 males) lived in a range of housing situations (market rental, subsidized, supportive, and precarious housing). Results of a grounded theory analysis showed that even when people had access to four-walled housing structures, they didn't necessarily feel that their living environment was safe, secure, or conductive to having their health and social needs met. Exploring how people define home and their conditions for this designation revealed the ways in which people manage their living spaces to foster feelings of autonomy, security, constancy, and opportunities to strengthen their identity.

Conclusions: Understanding the distinction between housing and home, and the meaningful dimensions of peoples' living environments, can help improve options for appropriate housing, moving away from a one-size-fits-all approach.

Basic Sciences: Virology and Pathogenesis

Sciences fondamentales : Virologie et pathogenèse

BS2.01

APOBEC3 Proteins: New Players in HIV Integration Site Selection in T Cells

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The chromosomal architecture surrounding HIV integration sites in the human genome can significantly enhance or inhibit HIV transcription. This is particularly important in CD4+ T cells, where the HIV genome can be silenced for long periods of time leading to the generation of a latent reservoir. During integration site analyses, sequencing of integrated HIV LTR-human genome junction sequences often reveals heterogeneous LTR sequences. Given the ability of apolipoprotein B mRNA editing enzyme catalytic polypeptide-like 3 (APOBEC3) to generate G to A mutations in HIV cDNA, and that APOBEC3F and APOBEC3G remain associated with HIV pre-integration complexes in the nuclei of infected cells, we asked whether virion-packed APOBEC3F and APOBEC3G proteins influence integration site selection.

We performed a comprehensive bioinformatics analysis of >18,000 integration sites in CEM-SS T cells infected with APOBEC3-containing HIV virions. We discovered that APOBEC3F and APOBEC3G expression significantly and differentially influenced integration site selection. APOBEC3 enriched integration in or near a variety of genomic features, most notably transcriptionally-silent heterochromatin-rich satellite DNA. Interestingly, APOBEC3G expression significantly enhanced integration into genes, independent of its deamination activity. In contrast, wildtype APOBEC3F did not alter integration targeting of genes; however, its deamination-defective mutant significantly enhanced integration into genes. Analysis of the three-dimensional spatial location of integration site hotspots within the nucleus showed that in the presence of APOBEC3G, integration was enriched in transcriptionally-active genes located at the nuclear pore. Intriguingly, in the absence of APOBEC3G, integration was enriched in heterochromatic lamin-associated domain borders. Analysis of an identified 'super-hotspot' region revealed a strong sequence determinant correlating with the presence of nonB-DNA motifs. Together, our findings provide a deeper understanding of the early events of HIV integration site selection and identifies a new role for APOBEC3F and APOBEC3G in influencing overall HIV integration site selection, particularly in features conducive to HIV latency.

BS2.02

Differential Ability of HIV-1 Nef Alleles Across Viral Subtypes to Antagonize SERINC3 and SERINC5

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Background: HIV Nef enhances virion infectivity by downregulating restriction factors SERINC3/5 from the cell surface. Nef is highly diverse among viral subtypes, but most reports have focused on SERINC5 antagonism using lab-adapted subtype B Nef strains. This study aims to characterize SERINC3/5 antagonism by patient-derived Nef alleles representing subtypes A, B, C & D.

Methods: Nef alleles were isolated from plasma RNA of 339 chronic ART-naïve HIV-infected individuals from Uganda, Canada and South Africa (92 subtype A, 91 subtype B, 71 subtype C and 85 subtype D clones). SERINC3/5 downregulation was assessed by flow cytometry following co-transfection of CEM CD4 T cells with Nef and SERINC3-iHA or SERINC5-iHA; and results normalized to WT Nef (NL4.3 strain). Nef polymorphisms associated with decreased activity were identified by statistical analyses and confirmed by site-directed mutagenesis.

Results: Subtype B clones displayed the greatest ability to antagonize SERINC5 (median 102 [IQR 96-110]% activity) compared to subtype D (98 [IQR 74-104]%; $p<0.001$), subtype C (88 [IQR 74-99]%; $p<0.0001$) and subtype A (83 [IQR 67-95]%; $p<0.0001$). In contrast, subtype B clones displayed the poorest ability to antagonize SERINC3 (55 [IQR 27-92]%) compared to subtype D (88 [IQR 64-97]%; $p<0.0001$), subtype C (82 [IQR 50-96]%; $p=0.01$) and subtype A (83 [IQR 50-100]%; $p<0.0001$). Codon-function analysis revealed that the inability to antagonize SERINC3 was attributed to the absence of S_8, I_{11} or V_{11} in Nef. Point mutations S8R and I11G impaired SERINC3 downregulation activity in NL4.3 Nef (25% and 0% activity, respectively).

Conclusions: These results demonstrate natural variation in Nef's ability to counteract SERINC3/5 that may be relevant for pathogenesis. Differential function of subtype B Nef clones, which were most efficient against SERINC5 but least efficient against SERINC3, could be explained by polymorphisms located at residues 8 and 11.

BS2.03

Suppression of HIV-1 and Adenovirus Infection by a Novel Inhibitor of RNA Processing

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RNA processing plays a central role in the gene expression of eukaryotic cells and many mammalian viruses. By exploiting this dependency, we discovered a modulator of RNA processing, compound 191, as a potent inhibitor of both HIV-1 and Adenovirus replication. 191 dramatically reduces expression of HIV-1 structural (Gag/Env) and regulatory (Tat/Rev) protein/polyproteins (IC_{50}: 750 nM). Addition of MG-132, however, reverses 191's effect on Tat accumulation, suggesting that this compound enhances proteasomal degradation of this factor. 191 is also effective against HIV-1 strains resistant to current antiretroviral drugs. This molecule induces limited changes in total protein synthesis, gene expression (0.5% of 11,406 genes), and RNA splicing (0.3% of 9,806 events) of the host cell. In parallel, 191 treatment of Adenovirus infected cells causes a 1000 fold reduction in viral yield (IC_{50}: 900 nM). Inhibition is associated with blockages in DNA replication and subsequent late gene expression. Consistent with disrupting RNA processing and Rev function, addition of 191 to HIV-1-infected cells reduces accumulation of unspliced and singly spliced viral RNAs. In Adenovirus-infected cells, 191 altered the accumulation of alternatively-spliced isoforms of E1A mRNAs and reduced expression of all late viral structural protein-encoding mRNAs tested (100K, fiber, hexon, and penton base). Suppression of HIV-1 gene expression by 191 was determined to require activation of Ras-Raf-MEK1/2-ERK1/2 signaling by a mechanism involving the stimulation of G protein coupled receptors at the cell membrane. Supporting this hypothesis, overexpression of multiple variants of the small G protein, Ras, and addition of several small molecule activators of MEK1/2-ERK1/2 signaling lead to inhibition of HIV-1 gene expression. These findings support the modulation of alternative cellular molecules for controlling HIV-1 replication and reveal the potential for a future drug to suppress multiple viral infections, with limited side effects to the host, by influencing a common host function—RNA processing.

BS2.04

Depot Medroxyprogesterone Acetate (DMPA) Enhances Susceptibility to HIV-1 in Humanized Mice

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Women are at increased risk of sexually transmitted infections compared with men. Some female sex hormones and hormonal contraceptives may contribute to this risk. Recent meta-analyses indicate women on Depot Medroxyprogesterone Acetate (DMPA), a progestin-based contraceptive commonly used in Sub-Saharan Africa, are 1.4 times more likely to acquire HIV than women not on hormonal contraceptives. However, the exact mechanisms by which the enhanced susceptibility occurs *in vivo* are still not clear. Here, using humanized mice (Hu-mice) we demonstrate that physiological doses of DMPA significantly enhanced intravaginal HIV-1 infection (3.25 OR, 1.28-8.86 CI; P=0.016; N=95) without increasing classical HIV-1 target cells (CD4+CCR5+) in the vaginal tract, and that DMPA increased the window of HIV-1 susceptibility to 5 weeks post-DMPA, compared to Hu-mice challenged during diestrus (progesterone high phase of estrous cycle). DMPA decreased local viral shedding in the vaginal lavage, without affecting plasma viral titres, and slowed viral dissemination. As no significant difference in vaginal T cells was observed, we examined other HIV target cells by immunohistochemistry and showed that human CD68+ macrophages were significantly enriched at 1 week ($P<0.01$) and 4 weeks ($P<0.001$) post-DMPA compared to diestrus. Taken together, results suggest DMPA enhances susceptibility to HIV-1 *in vivo* in Hu-mice by at least two mechanisms; elongating the window of vulnerability and enhancing non-classical HIV target cells, the CD68+ macrophage population, in the vaginal tract. This is the first study to show that DMPA significantly enhances HIV-1 infection in Hu-mice as compared to diestrus (progesterone high), and that DMPA might increase susceptibility to HIV-1 by enhancing and sustaining macrophage populations in the vaginal mucosa. Understanding the factors in the local mucosal environment that affect susceptibility to HIV-1 is important given that DMPA is used by >8M women in sub-Saharan Africa, where HIV-1 is endemic.

BS2.05

Flt3L Treatment Reduces HIV Infection and Replication in Humanized Mice via a Plasmacytoid Dendritic Cell-Dependent Process

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Plasmacytoid dendritic cells (pDCs) play a crucial role in host's immune responses through their ability to secrete high levels of IFN-I and other proinflammatory proteins. HIV infection has been shown to promote redistribution of pDCs to lymphoid tissues and induce apoptosis of pDCs in the gut. However, it remains poorly understood how pDCs are affected in this setting and to what extent they shape the outcome of early HIV infection. CDX-301, a recombinant form of fms-like tyrosine kinase-3 ligand (Flt3L), binds the Flt3 receptor on progenitor cells and enhances the development and mobilization of DCs to tissues. In this study, we show that HIV infection leads to significant depletion of pDCs in the blood, spleen and guts of humanized (hu) NSG and BLT mice without concomitant accumulation in other tissues. Importantly, Flt3L-treated mice consistently had a meaningfully delayed viral kinetics and markedly reduced viremia compared to untreated animals. The frequency of infected CD4 T cells was globally reduced in the treated group. Interestingly, antibody-mediated depletion of pDCs completely abolished the effect of Flt3L treatment, demonstrating that the control of HIV replication was driven by pDCs. Additionally, CDX-301 averted the otherwise loss of pDCs in HIV-infected mice. Functionally, pDCs from CDX-301-treated mice were more responsive to TLR7 agonist stimulation compared to those in Flt3L-untreated animals, further highlighting the protective effect of CDX-301. *In vivo* IFN-I blockade analysis and global screening of host factors are underway to define precisely the molecular mechanism which governs Flt3L-mediated control of HIV infection. Overall, our results underscore the importance of pDCs during acute HIV infection and provide an insight into potential new approaches to not only combat HIV persistence but also prevent the development of HIV reservoirs.

*equal contributions

BS2.06

Seeing is Believing: Identifying Intermolecular Complexes Mediating HIV-1 Immune Evasion Through Microscopy

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A major factor preventing the elimination of HIV-1 lies within the ability of the virus to hide from the immune system. This inherent ability of HIV-1 to confuse the immune system is accomplished by the small accessory protein Nef. Specifically, MHC-I downregulation by the HIV-1 Nef is of critical importance in preventing infected cells from cytotoxic T-cell mediated killing. Nef downregulates MHC-I by modulating the host membrane trafficking machinery, resulting in the endocytosis and eventual sequestration of MHC-I within the cell. In the current report, we identify a molecular map demonstrating the subcellular compartments mediating viral immune evasion. By utilizing the intracellular protein-protein interaction reporter system, bimolecular fluorescence complementation (BiFC), in combination with super-resolution microscopy, we identified the membrane trafficking regulator PACS-1 to be critical in MHC-I sequestration. The interaction between PACS-1 and Nef was found to be essential in the recruitment of the clathrin adaptor AP-1 to the Nef:MHC-I complex. Through super-resolution microscopy, we determined that mutation of the Nef:PACS-1 interface doubled the molecular distance between AP-1 and MHC-I (30nm to 75nm), highlighting the role of PACS-1 as a critical mediator of Nef-mediated MHC-I downregulation. Furthermore, we demonstrate that mutation of the Nef:PACS-1 interaction drastically changes the localization of MHC-I to early endosomes. Overall, we highlight the ability of super-resolution microscopy and fluorescent imaging to identify and track multi-protein complexes mediating HIV-1 immune evasion. Understanding these complex molecular pathways will aid in the development of new inhibitors targeted at crippling HIV-1's ability to evade the host's immune surveillance system.

BS2.07

The HIV-1 Accessory Proteins Nef and Vpu Downregulate the Immune Cell Surface Receptor CD28 in CD4+ T Cells

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The HIV-1 accessory proteins Nef and Vpu interact with and hijack host cellular proteins, including the membrane trafficking machinery, to promote viral replication and persistence. This is accomplished in part by downregulating cell surface receptors, such as the key immune cell activating co-stimulatory receptor CD28. However, the mechanism utilized by Nef and Vpu to downregulate CD28 is not yet fully understood. Herein, we demonstrated that Nef and Vpu mediate a decrease in both cell surface and total CD28 protein levels in $CD4^+$ T cells. We have also investigated the mechanisms utilized by Nef and Vpu to mediate CD28 downregulation. Namely, we have implicated the cellular degradation machinery in mediating downregulation through the use of inhibitors. Moreover, we implicated the Nef LL_{165} and DD_{175} and Vpu LV_{64} and $S_{52/56}$ motifs, which interact with specific cellular membrane trafficking machinery, in CD28 downregulation. Finally, infection with viruses encoding or lacking Nef and Vpu have differential effects on activation upon stimulation. Ultimately, the downregulation of CD28 may act in concert with additional Nef and Vpu functions to optimize cellular activation levels for viral replication and persistence.

BS2.08

Novel Targets for Therapeutics: the Role of Host SR Proteins in the Regulation of HIV-1 Gene Expression

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HIV-1 replication requires careful regulation of viral RNA processing, a process that is regulated by with host factors (SR and hnRNP proteins). Disruption of these interactions dramatically impairs virus replication. To identify members of the SR protein family regulating HIV-1 RNA processing, we assessed the effect of depleting individual SR proteins on HIV-1 RNA accumulation and gene expression in three cell lines (HeLa, CEM-T4, and differentiated THP-1). Loss of SRSF1, 4 and 6 induced a significant loss of Gag and Env expression and a corresponding reduction of viral RNA abundance in all cell lines tested. In contrast, depletion of SRSF 2, 3, 7, and 9 enhanced HIV-1 Gag and Env production within CEM-T4 but not THP-1 cells, an effect that can be partially attributed to the different levels of expression among the cell lines. RNP immunoprecipitation (RIP) assays determined that many of these SR proteins are associated with all or a subset of HIV-1 RNAs, consistent with a direct mechanism of action.

Given that SR function is a dependent on phosphorylation, we also tested SR kinase inhibitors for their effect on HIV-1 expression and replication. These studies revealed that leucettine L41 inhibited HIV-1 gene expression in all cell lines tested as well as dramatically reduced HIV-1 replication in PBMCs. Surprising, leucettine L41 treatment altered the function of only a subset of SR proteins, in particular SRSF1, 4, 10 and Tra2ß which play important roles in regulating HIV-1 RNA processing. Together, these findings identify multiple host factors playing critical roles in regulating HIV-1 RNA processing and establish the utility of splicing modulators as possible therapeutics.

Clinical Sciences: Women, Pregnancy and Parenthood

Sciences cliniques : Femmes, grossesse et parentalité

CS2.01

Towards Elimination of Vertical Transmission: Canadian Perinatal HIV Surveillance Program

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Objectives: To describe demographics, antiretroviral treatment during pregnancy, and vertical transmission (VT) rates in the Canadian perinatal HIV surveillance cohort of births to HIV+ women in the combination antiretroviral treatment (cART) era.

Methods: 23 Canadian pediatric and HIV centres report data yearly, including maternal characteristics, pregnancy cART and infant outcome. VT rates are based on the "perinatally identified cohort" defined as infants born in Canada and identified within 3 months after birth.

Results: There have been 3691 mother-infant pairs between 1997-2016; 35% were identified in Ontario, 22% in Quebec,16% in Alberta, 13% in British Columbia, and 7% each in Manitoba and Saskatchewan. Ontario has consistently had the highest proportion, but a growing proportion are in Saskatchewan, (13% of the 479 mother-infant pairs in Canada in 2015-2016. Overall, 68% of women acquired HIV heterosexually, 21% through injection drug use (IDU) and 1% perinatally; the proportion of IDU has dropped from 40% in 1997 to 18% in 2016. 51% of women were Black and 23% were Indigenous. Overall, the VT rate was 1.8%; VT dropped steadily from 8% in 1997 to 0.3% in 2012-2014 but increased to 0.7% (3 cases) in 2015-2016. Among the 15 pregnant women who did not receive cART in 2016, there were no perinatal transmissions. Since 1997, of women receiving greater than 4 weeks cART prior to delivery the VT rate was 0.2% (5/2888). The proportion receiving less than 4 weeks of cART was initially 20.0%, decreasing to a low of 3.0% in 2014 but increasing again to 5.6% in subsequent years.

Conclusions: Despite universal access to HIV testing, prenatal care and cART in Canada, 0% transmission has not been achieved and rate of vertical transmission has increased in the past years. Efforts to ensure uptake of optimal therapy must continue.

CS2.02

Examining the Live Birth Rates of Women Living with HIV (WLWH) in British Columbia (BC) from 1997-2015

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Background: Some data suggest WLWH experience decreased fertility. In the cART era, with increased life expectancy, WLWH are contemplating pregnancy more often. Few studies have examined longitudinal changes in birth rates for WLWH since the initiation of cART. We examined the birth rates of WLWH in BC using population level data from 1997-2015.

Methods: Data on WLWH were abstracted from the BC perinatal HIV database and the BCCFE drug treatment data. BC population data were obtained from vital statistics BC. Negative binomial regression was used to compare birth rates between WLWH and the BC population by year (1997-2015) and age group (15-24, 25-34 and 35-49 years). Birth rates are expressed as number of births/1000 person-years (py).

Results: From 1997-2015 there were 456 births to WLWH over 14,539 py, and 811,213 births to all BC women over 20,300,406 py. WLWH had a lower crude birth rate over this period compared to BC women [31.4 (95%CI=28.6-34.30 vs. 40.0 (95%CI39.3-40.1), age-adjusted risk ratio=0.85, 95%CI=0.75-0.95, p=0.006]. Compared to BC women, WLWH aged 15-24 had a higher birth rate, while WLWH aged 25-34 and 35-49 had lower birth rates (p<0.0001). Among WLWH and BC women, birth rates decreased over time for ages 15-24, and increased for ages 25-34 and 35-49 (p<0.0001). The proportion of births among WLWH aged 35-49 has increased over time. In 1997, 1 out of 16 births to WLWH were to women aged 35-49 versus 10 out of 24 births in 2015.

Conclusions: WLWH have lower birth rates versus the general population, but older WLWH are increasingly likely to have a pregnancy in their later reproductive years. This analysis emphasizes the need to better understand factors associated with reproductive choices among WLWH in this cART era, the risks of later pregnancy, and the impact of HIV and cART on fertility.

CS2.03

Preeclampsia is Associated with High Placenta mtDNA Content Among Women Living with and without HIV

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Background: Preeclampsia, a hypertensive disorder characterized by intermittent placenta blood flow, is an important cause of maternal and fetal morbidity and mortality, affecting ~4% of Canadian pregnancies. Recent studies in women not LWH have implicated placental mitochondrial dysfunction in preeclampsia. Women living with HIV (WLWH) experience higher rates adverse perinatal outcomes. As antiretrovirals can affect mitochondrial function, we sought to investigate placenta mitochondrial DNA (mtDNA) content, a marker of mitochondrial function.

Methods: Placental samples from WLWH and non-HIV risk factor matched controls enrolled in the prospective Canadian cohort CARMA-PREG were collected. Placental mtDNA content was quantified by multiplex qPCR. Univariate and multivariate associations between mtDNA and preeclampsia, cART type (non-boosted protease inhibitors -PI- *vs*. boosted PI) during pregnancy, and other maternal factors were investigated.

Results: Among the 136 WLWH and 60 controls, 24 (18%) and 9 (15%) had a preterm delivery, and preeclampsia occurred in 10 (7.5%) and 4 (6.7%), respectively. Seven (50%) of preeclampsia cases were among Black women. Most WLWH received a boosted PI (66% *vs.* 23% non-boosted PI *vs*. 11% other). HIV status and preterm delivery showed no association with mtDNA but a diagnosis of preeclampsia ($p<0.001$) and/or a caesarian section *(vs*. vaginal) delivery ($p=0.037$) were associated with higher mtDNA. Among WLWH, those who received a non-boosted PI had higher mtDNA compared to controls ($p=0.008$). In a multivariable model of all women that included ethnicity, mode of delivery and preeclampsia, the latter remained independently associated with higher mtDNA ($p=0.002$).

Conclusions: Within this cohort, the incidence of preterm delivery and preeclampsia were similar in both WLWH and controls and high relative to national rates. The placenta mtDNA elevation seen in women with preeclampsia may reflect mitochondrial proliferation as a compensatory mechanism to meet energy demand in the context of reduced blood flow and/or increased oxidative stress.

CS2.04

A Meta-analysis of Amenorrhea in HIV

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Background: It is increasingly important to understand reproductive health of women living with HIV (WLWH), particularly as child-bearing has become a safe option for those on stable antiretroviral therapy. Currently, there is mixed evidence on the association between HIV and amenorrhea with some studies showing increased prevalence of amenorrhea in HIV and others demonstrating no relation. Here, we conduct a meta-analysis of landmark trials of amenorrhea in HIV in order to characterize this important correlation.

Methods & Results: A total of 322 articles were screened from Ovid Medline and Embase for observational studies of amenorrhea in premenopausal WLWH. Studies were only included if they were control matched and defined amenorrhea as absence of menses for three months or greater. A total of six studies met inclusion criteria for a total of 8925 women (6570 WLWH). A random-effects model was used for the meta-analysis to demonstrate a significant association between HIV and amenorrhea ($OR = 1.68$, $p = 0.0001$). In the majority of studies, substance use, smoking and socioeconomic status were controlled for and did not vary between WLWH and controls. In the majority of studies, low BMI or weight loss were significantly more frequent among WLWH. There was no clear association between CD4 count and amenorrhea.

Conclusions: This meta-analysis compiles the largest population assessment of menstrual disturbances in HIV to date to suggest increased prevalence of amenorrhea in HIV. Our data lends evidence to suggest that HIV alone predisposes to amenorrhea independent of substance use and socioeconomic status, a finding that may be related to reduced BMI.

CS2.05

A Qualitative Analysis of Experiences Among Clients Attending the Positive Pregnancy Program (P3)

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Objective: To evaluate the experiences of people attending the Positive Pregnancy Program (P3), a multidisciplinary program in Toronto Canada, which cares for pregnant individuals and their families having, or living with increased risk for acquiring, human immunodeficiency virus (HIV).

Study Design: Qualitative interviews were performed by peer research associates with patients in the third trimester. Each interview lasted from 1-2 hours, and interviews were carried out with successive women until saturation of

themes occurred. Interviews explored satisfaction with the program components and the care provided by P3 providers. Data were analyzed using NVivo.

Results: Fourteen women living with HIV were interviewed. Discussion topics were focused on experience with P3 program while living with HIV in pregnancy. On the theme of experience with P3, respondents reported strong satisfaction. Specific advantages included the unique multidisciplinary nature of the care team (midwife, obstetrician, nurse, social worker), program integration with AIDS service organizations (community organizations, settlement, peer and housing services) and primary HIV providers, the family-centred and holistic approach to care, and creative solutions with respect to status disclosure and infant feeding. The other major emerging themes related to stress caused by HIV-related stigma, concerns of unwanted disclosure to family/friends, concerns about HIV transmission to the baby, and issues related to marginalization (precarious financial, immigration, and housing status). Participants made several concrete suggestions for ways to improve client experience with the program.

Conclusion: Overall satisfaction among P3 clients was high, with specific aspects of the program highlighted as advantageous. Clients in our program continue to experience distress related to stigma, risk of status disclosure, and perinatal transmission.

CS2.06

Unknown Maternal HIV Status at Delivery and Neonatal Antiretroviral Prophylaxis BC: 1-Year Review

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Background: Since 2000, BC's provincial emergency Prevention of Perinatal HIV Transmission Program has provided prophylaxis kits to all hospitals doing routine deliveries. For women presenting at delivery who may be in the HIV seroconversion window, BC guidelines recommend starting the infant on triple antiretroviral prophylaxis (tARP), and discontinuing once maternal HIV-RNA confirmed negative.

Methods: In a quality assurance review, we retrospectively reviewed all mother-infant pairs (MIP) who may have been in the seroconversion window (demographic data, HIV tests results and consultations) recorded at the provincial referral centre between 1Dec2016 and 30Nov2017.

Results: Over the study period, 111 MIP were recorded, over twice than the ~50 MIPs seen annually in the early years of the program. Sixty-five percent delivered in the metropolitan Vancouver area, 19% in the North or Interior regions and 15% on Vancouver Island. Indications for starting tARP were injection drug use within 48 hours of delivery or high-risk activities since last HIV test (80%), poor engagement in antenatal care, an HIV+ partner, STI in pregnancy or unplanned home/hotel delivery. Maternal HIV-Ab was negative in 103 women and 3 infants (when mother unavailable). There was one false positive result, and 4 unknown. HIV-RNA was obtained at delivery in 84 mothers (76%); two had low level RNA detected (repeat testing was negative), with the remainder negative. Among 100 infants started on tARP, 91% stopped within 1 week when maternal HIV status could be confirmed, and 9% completed 6 weeks. There were no perinatal HIV infections.

Conclusion: In 2017, over 100 women delivered in BC who were considered at high risk for recent HIV acquisition. None tested positive at delivery, possibly as a result of intense prevention strategies in BC. Obtaining a maternal HIV-RNA at delivery in HIV-negative women with recent risk factors remains essential to limit infant tARP duration.

CS2.07

Women Living with HIV Identify Critical Need for Trauma-Informed HIV Care Models to Support ART Use in Metro Vancouver, Canada

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Purpose: Trauma-informed care (TIC) acknowledges the historical impact of trauma and seeks to prevent re-traumatization from contact with health care systems and providers. Emerging evidence suggests that women living with HIV (WLWH) may experience disproportionately high rates of violence and trauma over their lifetime, and yet there is limited research on TIC within HIV care among WLWH. We investigated the social and structural factors correlated with identifying TIC supports as critical for ART use among WLWH.

Methods: Drawing on longitudinal community-based research cohort with cis and trans WLWH who live or access HIV care in Metro Vancouver, SHAWNA (Sexual Health and HIV/AIDS: Women's Longitudinal Needs Assessment, 2014-2017), we measured self-identified supports required to use ART medications: 1) trauma/counseling supports; 2) women and family-centred care; 3) peer support; 4) health accompaniment; and 5) addictions support. Bivariate and multivariable multinomial logistic regression using generalized estimating equations (GEE) were used to examine social and structural correlates of needing TIC to take ART.

Results: Overall, 254 WLWH with 637 observations over baseline and three years of follow-up were included; of whom 30.7% reported needing TIC supports to take ART. In multivariable GEE analysis, factors independently correl-

ated with identifying needing TIC to take ART medications included: experiencing recent physical or sexual violence (OR:2.34, 95% CIs:1.14-4.79), Indigenous women having a family member who attended residential school (OR:2.10, 95% CIs 1.07-4.12), recent injection drug use (OR:2.36, 95% CIs:1.25-4.46) and a history of mental illness (OR:2.60, 95% CIs:1.18-5.73)

Conclusion: Guided by WLWH, results underscore the urgent need for integrating TIC within HIV care environments. A TIC approach must address historical legacy of colonization and residential schools for Indigenous women, alongside ongoing violence, mental health and substance use challenges. Policies and education programs for health providers together with WLWH to create safe HIV care environments for WLWH

CS2.08

Understanding the Importance of Fatherhood Among Men Living with HIV in Ontario

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Introduction: While pregnancy and motherhood have become paramount clinical issues for women with HIV, the academic and healthcare communities have been inattentive to parenting issues among men with HIV. As such, our team explored the concept of fatherhood among a cohort of men with HIV from Ontario.

Methods: We present a secondary analysis of cross-sectional data from a fertility desires and intentions study with men with HIV. The outcome of interest was based on the question: "Being a father is important to me" with a 5-point Likert scale dichotomized into strongly agree/agree vs. neutral/disagree/strongly disagree. Logistic regression models were fit to calculate unadjusted and adjusted odds ratios (ORs) and confidence intervals (CI) for significant correlates.

Findings: Of the 276 respondents, 118 were heterosexual and 158 were gay/bisexual, 55% were White, 49% lived in the Greater Toronto Area, 55% had never parented a child, and 65% wanted to parent in the future. 191 agreed that fatherhood was important to them (102 heterosexual and 89 gay/bisexual). In unadjusted analyses, heterosexuality (OR 1.52; 95% CI 1.15-2.03), African/Caribbean/ Black ethnicity (OR 1.57; 95% CI 1.12-2.19), and history of parenting (1.60; 95% CI 1.10 – 2.39) were significantly correlated with importance of fatherhood. However, none of these variables were significant in adjusted analysis. Stratified analyses between heterosexual versus gay/bisexual men yielded no significant correlates.

Implications: From the unadjusted model, we can extrapolate that factors such as sexual orientation, ethnicity, and current parenthood may influence how men with HIV value fatherhood. However, the other modelling suggests that the issue of fatherhood is complex among men with HIV. Thus, we must continue to explore issues surrounding parenting with men with HIV. Further, as clinicians, we should avoid the tendency to assume who values fatherhood and explore desires related to parenthood with all men with HIV in Canada.

Epidemiology and Public Health: Cascade of Care for HIV and HCV

Épidémiologie et santé publique : Cascade des soins pour le VIH et le VHC

EPH2.01

Missed Opportunities for Earlier Diagnosis of HIV in British Columbia, Canada: A Retrospective Cohort Study

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Background: In 2015, 40% of people living with HIV/AIDS (PLWH) in British Columbia (BC) presented late to care with CD4 counts <350 cells/mm3. Late presentation to care is associated with increased AIDS-related morbidity and mortality as well as increased HIV transmission. In this study, we identified missed opportunities for earlier HIV diagnosis.

Methods: A missed opportunity is defined as a healthcare encounter potentially related to HIV infection, occurring within 1-5 years prior to the date of HIV diagnosis. We developed a case-finding algorithm to identify healthcare encounters based on a published algorithm by Darling *et al.* 2016, expert opinion, as well as the BC Centre for Disease Control's classification of AIDS-defining illness and 2016's HIV testing guidelines. We applied this algorithm to the BC STOP HIV/AIDS population-based cohort. Eligible individuals were ≥18 years old, and diagnosed in BC between 2001 and 2014. Chi-Square tested risk factors associated with missed opportunities.

Results: Out of 2434 eligible PLWH, 28%, 40% and 47% had ≥1 missed opportunity event(s) during 1, 3 and 5 years prior to HIV diagnosis, respectively. In all the three time periods, females and PLWH aged ≥50 years were more likely to have ≥1 missed opportunity event(s) than their counterparts (p-value <0.0001). Only in the 5 years analysis, did we observe that PLWH living in remote and rural areas and those with a history of injection drug use experienced a higher number of missed opportunity events (p-value<0.001). The top three missed opportunities were

encounters related to pneumonia, sexually-transmitted infection, and diagnosis and/or treatment of anemia.

Conclusions: Missed opportunities for earlier HIV diagnosis are substantial. We identified three specific opportunities (i.e., pneumonia, sexually-transmitted infection, and anemia) as actionable events that should be targeted to address this deficit.

EPH2.02

Trends in HIV Diagnoses by Age and Ethnicity Among Men Who Have Sex with Men (MSM) in British Columbia, Ontario, and Quebec: 2006-2015

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Background: Approximately 48% of Canadians newly diagnosed with HIV are MSM, and 74% reside in British Columbia (BC), Ontario, or Quebec. We examined surveillance data for MSM newly diagnosed with HIV over a 10-year period to compare trends across provinces.

Methods: We analyzed data regarding new HIV diagnoses and age breakdown among MSM from 2006-2015 from the BC Centre for Disease Control, Ontario HIV Treatment Network, and Institut National de Santé Publique du Québec. We calculated three-year running averages of the number of diagnoses and age breakdown with the percentage change. The absolute number of diagnoses was unavailable for Ontario. Ethnicity data was available for all three provinces only from 2010-2015. We compared ethnicity distribution with 2016 provincial general population census.

Results: The three-year average of HIV diagnoses among MSM decreased by 14% in BC and 17% in Quebec. The proportion of MSM diagnosed with HIV aged <30 years increased by 7% in BC and Ontario and 12% in Quebec. The proportion of Caucasian or Canadian/European/American (C/CEA) ethnicity declined from 69.9% to 65.6% in BC, from 67.6% to 59.5% in Ontario, and from 84.8% to 81.0% in Quebec. C/CEA remained over-represented among MSM newly diagnosed with HIV in BC (compared to 47.7% expected), but not in Ontario or Quebec. Asian ethnicity was under-represented in all three provinces.

Conclusions: BC and Quebec show similar declines in new HIV diagnoses among MSM with a shift towards younger age of diagnosis in all three provinces. Over- or under-representation by ethnicity vary across provinces.

Table 1. Demographics of new HIV diagnoses among MSM in BC, Ontario, and Quebec

Year	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Change
British Columbia											
Number of new diagnoses	**160**	**173**	**181**	**153**	**153**	**170**	**149**	**154**	**153**	**136**	
(3-year average)		(171)	(169)	(162)	(159)	(157)	(158)	(152)	(148)		-14%
Proportion of MSM in all new HIV diagnoses	56%	57%	63%	58%	64%	69%	72%	66%	71%	67%	+11%
<30 years of age (3-year average)		26%	27%	29%	26%	26%	26%	30%	32%		+7%
30-39 years of age (3-year average)		32%	31%	30%	32%	32%	31%	28%	26%		-6%
>40 years of age (3-year average)		42%	42%	42%	42%	43%	43%	43%	41%		-1%
Ontario											
*Proportion of MSM in all new HIV diagnoses	48%	52%	54%	56%	62%	59%	61%	65%	65%	59%	+11%
<30 years of age (3-year average)		35%	38%	39%	40%	40%	39%	40%	42%		+7%
30-39 years of age (3-year average)		29%	28%	26%	26%	26%	26%	28%	28%		-1%
>40 years of age (3-year average)		36%	34%	35%	33%	34%	35%	32%	30%		-6%
Quebec											
Number of new diagnoses	272	214	252	203	228	205	206	237	178	195	
(3-year average)		(246)	(223)	(228)	(212)	(213)	(216)	(207)	(203)		-17%
Proportion of MSM in all new HIV diagnoses	60%	64%	65%	66%	67%	64%	64%	65%	62%	65%	+5%
<30 years of age (3-year average)		20%	19%	20%	23%	26%	28%	27%	32%		+12%
30-39 years of age (3-year average)		32%	30%	28%	30%	30%	32%	31%	28%		-3%
>40 years of age (3-year average)		49%	51%	51%	47%	44%	40%	42%	40%		-9%

*Calculated from diagnoses with known exposure category

EPH2.03

Prevention and Care Cascade for Hepatitis C Among People Who Inject Drugs in British Columbia, Canada

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Background: We constructed the HCV prevention and care cascade among PWID to characterize their progress in care and treatment compared to people with past and no injection drug use history in British Columbia (BC), Canada.

Methods: The BC Testers Cohort(BC-HTC) was used for this analysis and includes all individuals tested for HCV in BC since 1990. Laboratory data were linked to prescription drugs, medical visits, hospitalizations and mortality data. PWID were identified in administrative data using a validated algorithm. An injection drug use-related encounter within past 3 years was classified as recent drug use(PWID), >3 years as past drug use (past-PWID), and no record as no drug use(non-PWID). The following cascade of care stages were defined among people alive on December 30, 2016: 1) PWID on OST; 1) anti-HCV positive (diagnosed); 3) RNA tested; 4) genotyped; 5) initiated treatment; and, 6) achieved a sustained virologic response(SVR).

Results: In 2016, there were 38,888 PWID included in the BC-HTC and 22,953 (59%) were on OST in past 3 years. Of all PWID, 12,649 (33%) were anti-HCV positive. There were 9,412 past-PWID and 32,880 non-PWID anti-HCV positive individuals in the BC-HTC (total anti-HCV positive: 54,941) in 2016. More PWID received confirmatory RNA testing compared to past- and non-PWID(92% vs 75%/ 79%). Among those with a positive RNA test, a similar proportion of PWID(7,324/8,435; 87%), past-PWID (4,409/5,267; 84%) and non-PWID received genotype testing(17,040/19,297; 88%). However, of those genotyped, only 30% of PWID (n=2,211) compared to 40% of past-PWID (n=1,747) and 54% of non-PWID (n=9,156) had received HCV treatment. Among those who received treatment and were assessed for SVR, 85% of PWID and past-PWID, and 88% of non-PWID were cured.

Conclusion: HCV treatment rates among PWID are lower than non-PWID and would require substantial scale-up to reduce the overall prevalence of HCV infection among PWID.

EPH2.04

Population-level Cascade of Care for Hepatitis C Among People Living with and Without HIV Infection

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Background: People with hepatitis C virus (HCV) and HIV co-infection have high morbidity and mortality, which could be reduced by HCV cure. We compared HCV cascade of care among people living with HCV and HIV co-infection in 2012 and 2016 to characterize their progress in care and treatment after direct anti-viral therapy introduction in 2013 in British Columbia (BC).

Methods: The BC Testers Cohort (BC-HTC) was used for this analysis which includes all individuals tested for HCV since 1990. Laboratory data were linked to prescription drugs, medical visits, hospitalizations and mortality data. The HCV diagnosed population was classified as HIV positive or negative. We defined the following cascade of care stages: 1) anti-HCV positive; 2) RNA tested; 3) genotyped; 4) initiated treatment; and 5) achieved sustained virologic response (SVR).

Results: Of 52,968 and 54,941 HCV diagnosed individuals in 2012 and 2016, 5% were co-infected with HIV. More individuals with HIV co-infection (2012: 87%; 2016: 90%) received confirmatory HCV RNA testing compared to those with no coinfection (2012: 75%; 2016: 81%). Among those with positive RNA test, more people with HIV were genotyped (2012: 89%; 2016: 95%) than those without co-infection (2012: 81%; 2016: 87%). The gap in HCV treatment initiation between HIV positive (2012: 24%; 2016: 42%) and HIV negative individuals (2012: 36%; 2016: 46%) narrowed from 2012 to 2016. Among those who received treatment and were assessed for SVR in 2012, 72% of HIV negative and 62% of HIV positive individuals achieved SVR, whereas the SVR rate was 87% for both groups in 2016.

Conclusion: People with an HIV co-infection were known to progress well in confirmation of infection but were less likely to receive treatment in the interferon treatment era. The DAAs have closed the gap between HIV positive and negative groups in HCV treatment initiation and effectiveness.

EPH2.05

Variation in Hepatitis C Virus Treatment Uptake in the Era of Direct-acting Antivirals

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Background: Patients co-infected with HIV and hepatitis C virus (HCV) are a priority target for HCV treatment. However, patient, provider, and structural barriers impede wider treatment uptake. We assess direct-acting antiviral (DAA) uptake for patients in the Canadian Co-infection Cohort (CCC) and compare this with treatment uptake during the interferon era.

Methods: We included patients in the CCC with detectable HCV RNA after second-generation DAAs were approved by Health Canada (November, 2013) and followed them until December, 2016. Time to treatment uptake was modelled using a Weibull time-to-event model adjusted for patient characteristics thought to influence uptake and with a random intercept for each centre. We estimated the variation between centre intercepts, with and without centre-level covariates.

Results: Among the 981 eligible patients, 278 started a second-generation DAA. Patients with advanced fibrosis or undetectable HIV were more likely to start treatment; Indigenous patients, those injecting drugs or with genotype 3 HCV were less likely to start treatment (Table). The variation between centres (σ^2=0.29, 95% CrI: 0.09-0.89) was appreciably reduced when adjusted for the centre's province (σ^2=0.15, 95% CrI: 0.02-0.60). In contrast, higher variation between centres was seen in the interferon era (σ^2=0.87, 95% CrI: 0.49-1.5) and that variation was unchanged when adjusted for province (σ^2=0.88, 95% CrI: 0.44-1.6).

Conclusions: Variation in treatment uptake between centres is lower than it used to be suggesting a more uniform approach to treatment. Provincial reimbursement policies related to level of fibrosis now seem an important barrier to treatment uptake for co-infected patients in Canada.

Table: Associations between patient characteristics and treatment uptake.

Note that different characteristics were thought relevant to treatment uptake in the two different eras. In the middle column, characteristics thought relevant in the interferon era are used to model data from the DAA era.

Characteristics at baseline	Hazard ratio (95% credible interval)		
	DAA era Main analysis	DAA era Sensitivity analysis	Interferon era Previously published
Demographic characteristics			
Age (per 10 years)	1.2 (1.0 ; 1.4)	1.2 (1.0 ; 1.4)	0.9 (0.8 ; 1.1)
Female	1.0 (0.7 ; 1.4)	0.9 (0.6 ; 1.2)	0.6 (0.4 ; 0.9)
Indigenous	0.5 (0.3 ; 0.8)	0.5 (0.3 ; 0.8)	0.6 (0.3 ; 1.1)
Monthly income ≤ 1500 CAD	0.8 (0.6 ; 1.0)		
Currently homeless		0.6 (0.4 ; 1.0)	0.9 (0.5 ; 1.5)
Risk profile			
MSM	1.4 (1.0 ; 1.9)		
Active alcohol consumption	0.9 (0.7 ; 1.1)	0.9 (0.7 ; 1.1)	0.9 (0.7 ; 1.2)
Active IDU	0.7 (0.5 ; 1.0)		
History of IDU (but not active)	0.9 (0.6 ; 1.3)		
History of crack or cocaine use		0.6 (0.5 ; 0.9)	0.6 (0.4 ; 0.9)
Psychiatric diagnosis		1.1 (0.8 ; 1.5)	1.2 (0.9 ; 1.6)
Disease characteristics			
HCV genotype 3	0.7 (0.5 ; 1.0)		
HCV genotype unknown	0.2 (0.1 ; 0.4)		
HCV genotype 2 or 3		0.9 (0.6 ; 1.2)	1.8 (1.2 ; 2.6)
Fibrosis (APRI > 1.5)	1.9 (1.5 ; 2.5)		
Duration of HCV infection (per 10 years)		1.3 (1.1 ; 1.5)	0.8 (0.7 ; 1.0)
HIV viral load ≤ 50 copies	2.6 (1.8 ; 3.8)		
On antiretroviral therapy		2.2 (1.4 ; 4.1)	1.2 (0.8 ; 1.9)
CD4 cell count (per 100 cells/µL)		1.0 (1.0 ; 1.0)	1.1 (1.0 ; 1.1)

Abbreviations: DAA, direct-acting antiviral; CAD, Canadian dollars; MSM, men having sex with men; IDU, injection drug use; APRI, aspartate-to-platelet ratio index; HCV, hepatitis C virus.

EPH2.06

Trends in Time from HIV Diagnosis to Linkage to Care and Viral Suppression among Individuals Newly Diagnosed with HIV in Ontario, 2000 to 2014

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Background: Timely linkage to care and viral suppression after diagnosis are important for HIV treatment and prevention. We explored these longitudinal indicators among individuals newly diagnosed with HIV in Ontario using a province-wide laboratory cohort.

Methods: We created a sample of individuals newly diagnosed with HIV using a centralized public health laboratory database with records linked at the individual-level. The database contains diagnostic and viral load (VL) test results for the province and information documented by providers on test requisition forms. The sample included individuals who had a nominal HIV-positive diagnostic test (1996-2015) and no evidence of diagnosis prior to their HIV-positive laboratory record. We measured time from diagnosis to 1) first VL (linkage to care) and 2) first suppressed VL (<200 copies/ml). We stratified these indicators by sex, age and health region.

Results: A total of 13,410 individuals were nominally diagnosed with HIV between 1996 to 2015, of whom 3,797 (28.3%) had evidence of a previous diagnosis and were excluded. The median number of newly diagnosed individuals each year was 529 (range=368-599). Between 2000 and 2014, the percent linked to care within three months of diagnosis increased from 67.4% to 81.8% and the percent suppressed within six months doubled from 22.0% to 41.6%. The median number of days from diagnosis to first VL and suppressed VL decreased from 35 to 24 and 402 to 155, respectively. Indicators were generally similar for males and females, but worse for people of younger ages and those in the Northern health region.

Conclusion: Individuals newly diagnosed with HIV in Ontario between 1996-2015 showed improvement in the time to be linked to care and achieve viral suppression. Despite improvements, there were longer delays for both indicators among people of younger ages and those living in the North of Ontario.

EPH2.07

Determinants of Viral Suppression among People Living with HIV in British Columbia, Canada: Preliminary Findings from the SHAPE study

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Background: The STOP HIV/AIDS Program aims to improve treatment success among people living with HIV (PLWH) in British Columbia (BC) by improving access to HIV testing, antiretroviral therapy, and supportive HIV care. Achieving viral load suppression (VS) is the final clinical marker of the HIV cascade of care and an important indicator of treatment success.

Methods: This study provides preliminary investigations into the prevalence and predictors of VS in the STOP HIV/AIDS Program Evaluation (SHAPE) study. The SHAPE study is a longitudinal cohort of PLWH ≥ 19 years of age in BC and assesses clinical outcomes, health disparities, and identifies barriers to HIV care for PLWH in BC. For this analysis, bivariable and multivariable regression models were used to identify predictors of VS (defined as VL <50 copies/mL for ≥ 3 months in the year prior to interview).

Results: Of 503 participants who completed a baseline survey, 477 met the inclusion criteria (≥ 3 months of VL data available) and 408 (85.5%) achieved VS. In multivariable analyses, being older (>39 years) was positively associated with achieving VS [ages 40-49: aOR= 2.11 (95% CI= 1.03, 4.31); ages >50: aOR=2.45 (95% CI=1.27, 4.72)]. Those who were currently homeless (aOR= 0.21, 95%CI= 0.07, 0.62) or homeless within the last 12 months (aOR= 0.65, 95%CI= 0.30, 1.40) were less likely to achieve VS. This was also found for PLWH self-reporting injection drug use (IDU) (aOR= 0.24, 95%CI= 0.12, 0.47), MSM reporting IDU (aOR= 0.24, 95%CI= 0.09, 0.64) and other HIV transmission groups (aOR= 0.49, 95%CI= 0.23, 1.02) vs. MSM only.

Conclusions: Strategies for supporting individuals in HIV care must account for intersecting facets of marginalization that influence progression through the cascade of care. Targeted supports may help reduce health inequities experienced by individuals with IDU history, younger adults, and those facing housing instability.

EPH2.08

Engagement in HIV Care After Incarceration Among Women Living with HIV in Canada

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Background: Women living with HIV are disproportionately represented in correctional facilities in Canada. Post-release, women face competing priorities including securing housing, employment, and accessing healthcare. We evaluated the relationship between incarceration experience and engagement in HIV care among women living with HIV in Canada.

Methods: Baseline questionnaire data were analyzed for women living with HIV (transgender inclusive) enrolled in the Canadian HIV Women's Sexual and Reproductive Health Cohort Study (CHIWOS). 'Recent' (past year), 'ever' (more than past year), and 'never' incarceration experience was assessed. We conducted a multivariable logistic regression model with a nominal outcome of three levels: recent, ever, and never (reference) to estimate associations between recent incarceration and two measures of engagement in HIV care: current use of antiretroviral therapy (ART) and ART adherence (≥95%, Walsh Visual Analog Scale).

Results: Of 1,422 women, median age was 43 [IQR: 35-50], and 41% identified as White, 29% African, Caribbean, Black, 22% Indigenous, and 7% other ethnicities. Overall, 37% reported any and 6% reported recent incarceration experience, with significant differences between British Columbia (Recent: 10% Ever: 52% Never; 38%), Ontario (Recent: 5% Ever: 24% Never; 71%) and Quebec (Recent: 6% Ever: 22% Never; 73%) ($p<0.001$).

Women with recent incarceration were less likely to be: currently on ART (Recent: 75% Ever: 84% Never; 83%; $p=0.006$) and ART adherent (Recent: 35% Ever: 61% Never; 64% $p<0.001$). In adjusted analyses, recent incarceration remained independently associated with higher odds of sub-optimal adherence (aOR=3.14 [95%CI:1.55,6.36]). We detected no significant association between recent incarceration and current ART use (aOR=0.64 [0.24,1.68]).

Conclusions: Findings reveal a high prevalence of incarceration among women living with HIV in Canada, and a gap in engaging women in HIV care post-release: particularly in achieving optimal ART adherence. Women-centred prison outreach services to support women's transition back into their communities and care are critical.

Social Sciences: Impacts of Policies and Structures

Sciences sociales : Conséquences des politiques et des structures

SS2.01

HIV Criminalization in Canada: Key Trends and Patterns

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In Canada, people living with HIV can be charged and prosecuted for not disclosing their HIV-positive status to their sexual partners. In 2012, the Supreme Court of Canada ruled that there is a legal duty to disclose one's HIV-positive status before having sex that poses a "realistic possibility" of HIV transmission. As part of an effort to contribute to an informed public dialogue on the issue, this report provides a snapshot of the temporal and demographic patterns of HIV criminalization in Canada from 1989 to 2017. Since 1989, 184 people have faced charges related to HIV non-disclosure in 200 cases in Canada.

This analysis provides empirical evidence that substantiates concerns about HIV criminalization raised by Canadian advocates since the Supreme Court decision in 2012. First, it shows that the criminal law is increasingly used against people living with HIV from marginalized populations. Since 2012, the proportion of Black men and gay men charged in HIV non-disclosure cases has grown. Second, the analysis suggests that people living with HIV are often charged and convicted in cases in which the defendants' sexual activities pose a negligible risk, or no risk of HIV infection. Since 2012 the proportion of cases where no HIV transmission occurred has increased. Finally, the study provides evidence that the Canadian criminal justice system's approach to HIV non-disclosure is exceptionally punitive when compared to other sexual assaults. The average prison sentence for a person convicted for charges related to HIV non-disclosure is more than double the average sentence for sexual assaults in Canada. Overall, this report supports growing consensus on the need to reform criminal justice approaches to HIV non-disclosure. It reinforces advocates' calls to bring science to bear on the law and to limit the overly broad way the criminal law is used to respond to HIV non-disclosure.

SS2.02

Taking Responsibility: How Women Living with HIV Understand and Experience the Criminalization of HIV Non-disclosure

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Background: In Canada, the criminalization of HIV non-disclosure is founded on assumptions that people living with HIV are sexually and morally irresponsible, and do not engage in responsible behaviour in regard to themselves and others. These assumptions justify the use of criminal law as a necessary tool to ensure that people living with HIV are held responsible for their partner's sexual health, regardless of mediating circumstances.

Methods: Women, ART, and the Criminalization of HIV (WATCH) is a community- and arts-based study exploring the impacts of the criminalization of HIV non-disclosure on the lives of women living with HIV. Seven Body Mapping workshops were held with 48 women from British Columbia, Saskatchewan, Manitoba, and Ontario between June 2016 and May 2017. Sharing circles were held throughout each workshop to express stories connected to the images on women's Body Maps. Sharing circles were transcribed, coded, and underwent participatory thematic analysis.

Results: WATCH participants discussed how they understand and experience HIV non-disclosure, and contextualized their knowledge of the law within discussions about responsibility. Women identified numerous ways that they are responsible to themselves and others including sexual partners, family, and their community, and how the burden of responsibility that has been imposed on them through the criminal law has negative consequences on their lives. Women's narratives disrupt Westernized notions and broaden the conceptualization of responsibility as connected to one's culture and community.

Conclusions: The rigidity of applying criminal law to cases of HIV non-disclosure does not reflect the nuanced and complex ways that women understand and experience responsibility in relationship to themselves, others, and societal norms and expectations. WATCH offers an alternative discourse to how notions of responsibility are understood and shines an important light on how the legal expectation to disclose has significant implications on women's freedoms and human rights.

SS2.03

Community Perspectives on the Criminalization of HIV Non-Disclosure and its Impacts on Indigenous People who are HIV Positive

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In December of 2017, the Department of Justice released a report in which they raised concerns about the criminalization of HIV non-disclosure through legal practices in the Canadian Criminal Justice System. Although it was somewhat acknowledged that Indigenous communities experience disproportionate rates of HIV and intersecting layers of stigma, the depth of the impacts of this criminalization of non-disclosure and of the criminal justice system more broadly on Indigenous communities were not addressed. It is crucial to understand the distinct ways that the law impacts Indigenous communities and to recognize the colonial nature of Canadian criminal law and how it consistently compromises the well-being and self-determination of Indigenous peoples. We will ground this discussion in the key findings from a research project focused on Regina, Saskatchewan. We will outline the approach and methods with this project, which is a community-based collaboration with All Nations Hope Network, and present key findings. Semi-structured interviews were done with Indigenous people who are HIV positive, as well as with people volunteering and working to support this community. Participants were asked about their familiarity with Canadian legal practices and issues related to non-disclosure, the impacts of these laws on their lives and communities, and to assess existing and required community supports in Regina. Overwhelmingly, participants expressed that there is a need for more information related to Canadian law and HIV – for people who are HIV positive and for people in the community, for support workers, and for those in healthcare and legal professions. The complex ways that Indigenous people who are HIV positive experience criminalization, and the strengths and knowledge of the community must be centred in policy recommendations and in the educational and resource development that needs to be done.

SS2.04

A Tale of Three Cities: Housing Issues Over Time for People Living with HIV in BC

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Background: *Positive Living, Positive Homes* (PLPH) is a community-based research (CBR) study exploring the relationship between housing and health for adults living with HIV in British Columbia. Here we examine three case studies on housing issues and their health impacts between

baseline and follow-up interviews for PLPH participants in Greater Vancouver, Prince George, and Kamloops. We simultaneously highlight two key study methods: mapping personal spaces, and generating health/housing timelines.

Methods: Between June 2015 and Oct 2017, 99 adults living with HIV in three BC sites participated in baseline semi-structured interviews with follow-up after approximately one year. Each participant mapped their current living space, generated a personal health/housing timeline, and answered in-depth questions on housing, HIV, and overall wellbeing during the initial interviews. Follow-up interviews reported changes over the year, and renewed timeline and mapping as needed.

Results: Participants' health and housing experiences between initial and follow-up interviews varied widely, but some key themes emerged: housing transitions that strengthened participants' ties to community supports, facilitated good relationships with landlords and housemates, and increased autonomy, were shown to improve overall wellbeing. Housing transitions that negatively influenced health included those whose environments threatened sobriety, increased isolation, and risked participant exposure to physical and mental stressors.

Conclusions: Visual data collection methods such as the living space maps and timelines enhance diversity and reliability of data by helping participants recall details of their housing and health history. These findings facilitate the development of specific approaches that support PLHIV in their housing transitions, including: identifying financially, culturally, and otherwise appropriate housing; understanding HIV disclosure rights and developing skills for disclosure; supporting people in navigating their new communities; and having access to services and training that build capacity for community engagement.

SS2.05

Prevalence and correlates of HIV Disclosure Worries among Women Living with HIV in Canada

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Background: For women, HIV disclosure can be challenging in part due to gendered power dynamics, increased risk of violence, potential social rejection, and reduced access to treatment and care services. We examined HIV disclosure worry (HIV-DW) among women with HIV in the Canadian HIV Women's Sexual and Reproductive Health Cohort Study (CHIWOS) and assessed associations with sociodemographic and clinical variables.

Methods: CHIWOS is a community-based, multi-provincial (Ontario, British Columbia, and Quebec), longitudinal study where participants complete a peer-administered questionnaire. We used baseline CHIWOS data of women who answered >50% of the HIV-DW scale (n=1419). The HIV-DW scale consists of 5 items (α=.83) measured on a Likert scale with answers ranging from 'strongly agree' (4) to 'strongly disagree' (0) and final scores were computed for a value out of 100. Multivariable logistic regression was used to determine independent correlates of higher HIV-DW (defined as HIV-DW score ≥75). The model was developed using backward stepwise selection.

Results: Median age was 43 (IQR: 35-50) and median length of time living with HIV was 11 years (IQR: 6-17); 83% were on ART and 79% reported an undetectable viral load. Participants were ethnically diverse (22% Indigenous, 30% African/Caribbean/Black, 41% Caucasian/White, and 7% other ethnicities). The overall HIV-DW mean was 58.8 (SD=24.9); 34% had higher HIV-DW. In multivariable analysis, higher HIV-DW was associated with province of residence (adjusted odds ratio (aOR)=1.93; 95% confidence interval [CI]=1.28-2.92 for QC and similar for ON compared to BC); ethnicity (aOR=2.22; 95%CI=1.61-3.19 for African/Caribbean/Black women and aOR=1.45; 95%CI=1.01-2.10 for Indigenous women compared to Caucasian/White women); unstable housing [aOR=2.70; 95%CI=1.78-4.09]; and food insecurity [aOR=1.42; 95%CI=1.08-1.86].

Conclusions: Over one-third of women with HIV in Canada express substantial worry about HIV disclosure. Disclosure worry varies by markers of socio-demographic vulnerability, including ethnicity, province of residence, housing stability, and food security, and requires further evaluation.

SS2.06

'In the midst of plenty': Experiences of Food Insecurity Among Women Living with HIV in Metro Vancouver, Canada

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Background: While there is a growing body of literature on the relationship of food insecurity and HIV, there is limited understanding of the gendered factors that shape food insecurity. We examined food insecurity among women living with HIV (WLWH) to better understand the intersections between poverty, gender, and HIV.

Methods: As part of SHAWNA *(Sexual Health and HIV/AIDS: Women's Longitudinal Needs Assessment),* a longitudinal community-based research project, we conducted qualitative interviews with a sub-set of 64 WLWH (cis and trans women) in Metro Vancouver between 2015-17. Interviews were conducted by community researchers (including WLWH) and directed by a semi-structured interview guide co-developed with WLWH and community partners. Drawing on participatory research principles, data analysis was framed by feminist and socio-ecological frameworks.

Results: WLWH identified eating well with health and wellbeing. However, in the context of intersecting structural vulnerabilities, such as poverty, racism, and histories of violence, food insecurity negatively shaped the health of participants by reducing medication adherence or contributing to comorbities. Many participants relied heavily on food support services and despite an abundance of programs in some areas, it was difficult for WLWH to obtain nutritious foods in safe environments. Barriers included a lack of women-specific services, nutritionally insufficient food, mobility/distance to services and disadvantageous service regulations. WLWH identified women-specific services as critical for food access, especially given recent closures of women-specific HIV supports in Vancouver. Participants' also identified problems regarding a lack of access to cooking facilities/storage in low-income housing, and the lack of culturally-specific foods for racialized, Indigenous, and im/migrant WLWH.

Conclusion: Despite various food programs, there remain significant gendered barriers to food security among WLWH that contribute to poor health and reduced HIV treatment retention. Our findings demonstrate the need for improved integration of women-specific nutritional programs into HIV care and increased social assistance payments.

SS2.07

"We eventually got caught and got kicked out": The Impacts of Intersecting Stigmas on Health and Housing Experiences of Queer Women Sex Workers in Vancouver, Canada

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Background: Research has demonstrated that social-structural factors, such as social exclusion and violence, enhance HIV vulnerabilities among queer women. Yet, queer women sex workers' experiences have been largely overlooked despite evidence that this group of women encounter unique stigma, which often results in barriers to services, homelessness, and violence. Thus, the objective of this study was to qualitatively explore how queer women sex worker's experiences of stigma impacted health and housing access in Vancouver, Canada.

Methods: In-depth semi-structured interviews were conducted with 56 queer women sex workers in Vancouver, Canada between June 2012 and May 2013. Interview data were analyzed using theory- and data-driven approaches guided by a framework that positions health as an outcome of social, structural, and environmental contexts.

Results: Only 8 participants had secure, independent housing (e.g., apartments) while the majority (*n*=19, 33.9%) lived in supported housing buildings or were homeless (*n*=14, 25%). The majority of participants (*n*=38, 67.9%) were currently engaged in sex work and 49 (87.5%) were currently using drugs. Participants described sexual stigma in the form of discriminatory comments about their sexuality, and in the form of barriers to housing and complexities in maintaining their relationships in supported housing environments. Enacted stigma, particularly drug use-related stigma, was consistently experienced in healthcare settings. Consequently, some participants reported hiding their sexuality and relationships to mitigate felt stigma and to gain access to health and housing services.

Conclusions: Participants experienced a variety of stigma related to drug use, housing insecurity, and sexuality; thereby demonstrating the intersecting individual and social-structural dimensions of stigma related to sexuality and the criminalization of sex work and drug use. Stigma and social-structural factors, including expulsion from services, hiding one's sexuality to access services, and criminalization contributed to participant's health disparities and HIV vulnerabilities.

SS2.08

Excessive Punishments: Race, HIV Criminalization, and the Extreme Practices of Criminal Law

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Background: Critiques of HIV criminalization have shown how eager Canada has been to prosecute and convict people living with HIV for non-disclosure. Critics also describe the disproportionate convictions of people of colour and Indigenous people. Yet, if we examine the extreme uses of law in HIV non-disclosure cases, we see a different pattern than just overrepresentation of racialized people.

Objectives: This presentation discusses three distinct HIV criminal law cases in Canada, showing how extreme uses of criminal law target people of colour and Indigenous people to re-inscribe violence in Canadian law. Methodologically speaking, this presentation also aims to challenge biopolitical analyses to include race and racism into their analytical frameworks.

Methods: Following Foucault, state racism and violence become visible if we engage race and racism in biopower analytics. This critical race biopolitical analysis takes up race and racism in its examination of the most extreme criminal legal proceedings to highlight how the violence of

the law targets people of colour and Indigenous people in cases of HIV non-disclosure.

Results: While the USA may convict more people for criminal HIV non-disclosure, Canada is at the forefront of several worldwide legal precedents; Canada is the first country to convict someone for murder and possibly the first to convict a woman related to mother-to-child transmission. In addition to excessive charges and convictions, the court also seeks extreme sentencing as in the case of attempted aggravated assault for spitting. When examining the most excessive uses of HIV non-disclosure criminal cases, what is made visible is that these extreme uses of law target people of colour and Indigenous people.

Conclusion: Examining these three HIV criminalization cases of excessive punishments reveal how colonialism and racism continue to work through law and medicine, and urges citizenship theorists to connect to actual anti-colonial, immigration, and anti-racist struggles.

Community Practice Research: Issues for Impactful Community Practice

Recherche en pratique communautaire : Enjeux pour une pratique communautaire efficace

CPR.01

Improving the Establishment of Supervised Consumption Services Across Canada

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Supervised consumption services (SCS) are a vital component of a comprehensive public health approach to reducing the harms that may be associated with drug use. To operate an SCS without risk of criminal prosecution, prospective organizations are required to apply for an exemption by the federal Ministry of Health from the prohibition on unauthorized possession of controlled drugs under Canada's Controlled Drugs and Substances Act.

In Canada, expansion of SCS has been hindered by legislative and political barriers at all levels of government. While positive steps have recently been made to streamline the application process for an exemption under new legislation, and while many new sites have been approved across the country, the need for unsanctioned overdose prevention services and the current overdose crisis, however, indicate that needs are not being met and that SCS have yet to be adequately scaled up across Canada.

The Canadian HIV/AIDS Legal Network is documenting the barriers, real and perceived, for would-be SCS providers over the course of the changing legal environment. We offer to present the most up to date information about the implementation of SCS across the country and discuss existing facilitators and barriers faced by current and would-be SCS operators. We will also formulate recommendations for Federal, Provincial and Municipal authorities to facilitate the establishment of SCS in communities based on our review of the literature and interviews with key informants, including SCS operators, advocates and policymakers.

CPR.02

Exploring the Feasibility and Effectiveness of FOXY, an HIV/STI Prevention Intervention with Indigenous and Northern Adolescent Women in the Northwest Territories

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Background: Young Indigenous women experience disproportionately higher HIV infection rates than non-Indigenous women. In the Northwest Territories, youth rates of sexually transmitted infections are 10 times the national average. Yet there is a scarcity of culturally, age, and gender tailored HIV/STI prevention strategies for Northern Indigenous young women. The study objective was to explore the feasibility and acceptability of Fostering Open eXpression among Youth (FOXY), an interactive arts-based HIV/STI prevention program developed by and for Northern Canadians.

Methods: A multicenter non-randomized pragmatic cohort pilot study using a pretest/post-test design was used. Participants completed a baseline assessment before attending FOXY, and an immediate post-test following FOXY. The FOXY intervention involves seven school-based workshops lasting between 1 to 2 hours each, conducted with peer researchers over 1-2 days in communities across the NWT. Due to the non-normality of the outcome variables, a Wilcoxon test was conducted to assess pre and post-intervention score differences in the three outcome variables: HIV/STI knowledge, safer sex self-efficacy, and resilience.

Findings: Among the 199 participants, most (79.4%; n=154) identified as Indigenous and one-fifth (20.5%; n=39) as sexual minorities. Over half reported depression symptoms (59.8%; n=119), and over one-third reported food insecurity (31.7%; n=63). STI knowledge scores significantly increased following the intervention (M*dn*=4 to M*dn*=9; z=9.74, p<0.001, r=0.49). Safer sex self-efficacy scores were significantly higher following the intervention (M*dn*=88) in comparison with pre-intervention scores (M*dn*=82), z =4.11, p<0.001, *r*=-0.22. Finally, participants reported slightly higher resilience scores (M*dn*=41) compared to pre-intervention (M*dn*=40), z = -2.82, p <0.01, *r*=0.14.

Discussion: These pilot findings suggest that FOXY holds promise as an effective method of delivering sexual health information through peer education, and increasing STI knowledge, safe sex self-efficacy, and resilience. This study

offers preliminary evidence of the feasibility of arts-based interventions as an HIV/STI prevention approach and can inform scale-up plans.

CPR.03

Engaging Communities to Address Intersections Between HIV and Intimate Partner Violence

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Background: Intimate partner violence (IPV) is widespread among women living with HIV (WLWHIV) (Siemieniuk & al., 2013; Logie et al., 2017). However, WLWHIV who struggle with IPV must usually seek support for HIV and IPV from independent community resources (DiStefano & Hubach, 2011).**Objectives:** The objectives of this project are to link HIV and IPV milieus and facilitate the identification of common priorities for joint action to address intersections between HIV and IPV.

Methods: A community forum approach (Tétrault et al., 2013) was used to bring together, over two days, 12 community-based HIV and IPV service providers and 7 service users (women living with HIV and/or violence) to gather information, raise awareness about these social issues, and think collectively about paths forward.

Results: Through these processes of reflection, knowledge transfer, and data collection, three priorities that target intersections between HIV and IPV intervention were identified: the needs to 1) set up a services agreement between HIV organizations and the shelter resources for women victims of IPV; 2) develop tools for prevention, screening, crisis management, care and support for WLHIV and IPV; and 3) train providers to better intervene on intersections between HIV and IPV.

Discussion: In addition to mobilising WLWHIV who experience IPV, stakeholders and decision-makers from community-based HIV and IPV organizations, the community forum approach is a promising tool for research and to develop intersectoral action related to HIV and IPV intervention.

CPR.04

Beyond the Biomedical: An Ethnographic Study of a Community-Driven PrEP Intervention

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Randomized control trials have demonstrated clinical efficacy of PrEP. However, early oral tenofovir trials were mired in controversy for neither including nor responding to community concerns and for failing to ensure health service linkages. Despite the growing appeal of PrEP to HIV prevention planners, questions remain over its use outside of clinical trial settings. For this reason, the WHO and BMGF have funded demonstration projects to explore PrEP in "real world" settings. Ashodaya, a sex worker-led organization in South India, was designated as one of these sites, with PrEP being offered as part of a combination prevention package and alongside existing structural interventions. Ashodaya is internationally recognized as a leader in HIV prevention and care through a grassroots movement. An ethnographic study occurred over the course of the project, from June 2016 - December 2017, and included field visits, participant observation, and in-depth interviews with participants and the research team. Ashodaya's community-driven approach led to high retention with 640/647 participants remaining in the 16-month study, high levels of adherence, and demand for continued access to PrEP as the project nears completion. Community-driven processes employed during the demonstration project included: 1) an awareness raising phase that generated critical questions, proposed solutions, and demand for the new technology and 2) regular community-led adherence promotion, which offered ongoing support services that went beyond the scope of a biomedical intervention. Furthermore, as research participants, community leaders, program managers, and scientists engaged in democratic dialogues to identify and solve problems that emerged during the life cycle of the project, community solidarity bonds strengthened in ways that unexpectedly contributed to high retention and adherence. This community-led approach demonstrates that communities themselves can play lead roles in delivering clinical interventions and should be key partners in planning, implementation, and monitoring when considering new prevention and treatment technologies.

CPR.05

Environmental Scan of Rehabilitation and Mental Health Services that Support People Living and Aging with HIV in Canada

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Context: Rehabilitation services and other quality of life supports, broadly defined as those that help a person overcome body impairments, activity limitations and social participation restrictions, have a significant role to play in improving the lives of people living and aging with HIV.

Methods: *Realize* invited 133 community-based HIV/HCV/STBBI organizations across Canada to identify the types of rehabilitation/wellness, mental health, and aging-related services they currently offer. A total of 50 responses were received (response rate = 38%).

Results: The vast majority of organizations (95.7%) reported offering at least one mental health service, the most common type being peer support groups. Approxi-

mately two-thirds (65.2%) of respondents said their organization offered at least one service of relevance to people aging with HIV, but only eight organizations tailored these services specifically for people over the age of 50. Group support and education were the most common approaches for aging-related interventions. Just over half (59.6%) of responding organizations offered at least one rehabilitation/wellness program, with chronic disease self-management programs as the most prevalent. Respondents were also asked to indicate the reasons why these programs were not currently being offered within their organization, despite their potential to improve quality of life for people living and aging with HIV. The most commonly cited reasons for not offering mental health and/or rehabilitation/wellness programming was that these were not within the organization's mandate. For aging-related programming, the most commonly reported reason was lack of human resources.

Discussion: The results of this survey suggest that community-based organizations may struggle to prioritize rehabilitation services and quality of life supports for people living with HIV, HCV and STBBIs in their strategic and program planning, despite recognition of the value of rehabilitation/wellness, mental health and aging-focussed programming. *Realize* will introduce educational tools to support their efforts in 2018.

Key Populations: HIV Prevention and Treatment Interventions by, with, and for African, Caribbean and Black People

Populations clés : Interventions de prévention et de traitement du VIH par, avec et pour les Africains, Caraïbéens et Noirs

KP1.01

Increased Vaginal H2O2 in HESN Female Sex Workers Supports A Less Conducive Immune Milieu for HIV-Infection, via Altering Epigenetic Programming in Vaginal Cells

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Not all exposed to HIV-1 become infected. A sub-group of Kenyan female sex workers (FSWs) with known unprotected sex with HIV-infected clients remains seronegative (HESN). Such seemingly natural resistance to HIV-infection is associated with a quiescent baseline immune phenotype that could not be explained by genetic polymorphisms alone. *This study tested the hypothesis that microbial metabolites, such as* H_2O_2 and butyric acid could influence the mucosal immunologic regulation via modulating epigenetic programming.

Using ELISA kits and multiplexing protein assays, H_2O_2, nitric oxide (NO), and 29 cytokine/chemokine in the cervicovaginal lavage (CVL) were quantitated. In addition, the cellular histone deacetylase (HDAC) and acetyl-transferase (HAT) activities in the matched cervical mononuclear cells were assessed. Significantly higher levels of H_2O_2 and NO were found in the CVL of HESN-FSWs, compared to the age-matched non-HESN controls. CVL-H_2O_2 level inversely correlated with the CMC-HDAC activities (r^2=-0.79, $p<0.001$, n=32), which were positively associated with the levels of CVL-chemokine (MIG, IP-10, IL-8, CCL2 and MIP1b, p-values<0.01) of chemotactic function (pathway enrichment, $p<10^{-13}$). The inverse correlation between the CVL levels of H_2O_2 and chemotactic chemokine further support the role of CVL-H_2O_2 in modulating immune regulation via inhibiting the CMC HDAC activities. In vitro inhibition of HDAC activity by H_2O_2 (50mM) or SCFA (trichostatin A, 2nM or Na butyrate, 100mM) resulted in altered acetylation and phosphorylation of cellular proteins (i.e., histones, heat-shock proteins and proteins in cell-cell binding) and reduced expression of interferon (IFN) effector genes (and genes of inflammatory mediator. Inhibition of HDAC activities also resulted in reduced HIV-1 replication in infected cells; >90% reduction in gag, p24 expression ($p<0.001$) and less infected cells.

Significance: These observations suggest that by modulating soluble mucosal factors to affect the cellular epigenetic regulation of chemotactic genes, a less conducive milieu for successful HIV-infection can be induced to prevent HIV-transmission

KP1.02 {please see errata, page xi)

Impact of HIV Infection and MSM Status on Rectal Microbiome and Cytokine Profiles in Kenyan Men

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Background: The rectal microbiome plays an important role in regulating mucosal immunity at that site, which may have implications for rectal HIV acquisition in men. Both HIV infection and MSM status have been linked to altered gut microflora, but to date very few studies have been carried out in Africa.

Methods: A cross-sectional study was conducted to characterize the microbial and immunological environment of the rectum in a sample of MSM and straight men from Nairobi, Kenya. The microbiome was characterized pre- (fecal) and post- (mucosal) enema using 16 srRNA sequencing. Data were analyzed using the QIIME Greengenes software package. Concentrations of 37 inflammatory cytokines were analyzed using multiplex immunoassays from rectal mucosal fluid collected post-enema.

Results: Samples were obtained from participants comprising three study groups: HIV- MSM (n=39), HIV+ MSM (n=23), and HIV- non-MSM (n=15). Four microbiome clusters were defined using unsupervised hierarchical clustering: *Prevotella* cluster 1, *Bacteroides* or *Enterobacteriaceas*-dominant, *Prevotella* cluster 2 and an unspecified cluster. These groups were correlated between fecal and rectal specimens. The combination of *Bacteroides*-dominant and unspecified clusters were more common in HIV+ MSM (73%) and HIV- MSM (66%) while relatively uncommon in non-MSM (13%), In contrast, *Prevotella* cluster 1 dominated the non-MSM (60% vs 15% and 13% in HIV- and HIV+ MSM) mucosal samples (chi-squared p=0.01). HIV+ MSM had decreased alpha diversity compared to the other groups for both fecal (p=0.01) and mucosal (p=0.07) microbiomes. Cytokines levels were similar in both the HIV- and HIV+ MSM but the non-MSM had elevated levels of IL-8, LIGHT, MMP-2, MMP-3, and decreased levels of IFN-B and TWEAK (p<0.05).

Conclusions: MSM status was associated with significant alterations to the rectal microbial and immune milieu, potentially mediated through anal sex (though other causes are possible). Future work could determine whether rectal microbiome and cytokine concentrations impact HIV susceptibility.

KP1.03

Understanding the Acceptability of Pre-Exposure Prophylaxis in the African, Caribbean, Black Population: a Cross-Sectional study

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Background: The African, Caribbean, Black (ACB) population in Ontario has a high incidence of HIV infection. We assessed the acceptability of pre-exposure prophylaxis (PrEP) among heterosexual ACB adults in Toronto.

Methods: We recruited English-speaking, HIV-negative, heterosexually active ACB adults through peer recruiters and community-based organizations. Participants completed a 44-item questionnaire covering demographics, HIV risk behaviours, relationship dynamics, experiences of discrimination, HIV stigma, and opinions about PrEP. We used multivariable logistic regression to identify characteristics associated with PrEP acceptability (defined as willingness to use PrEP).

Results: Of 128 eligible participants recruited, most were women (62%) and of African ethnicity (45%). The median (IQR) age was 32 (25,40) years. The majority (78%) considered themselves at no/low risk for acquiring HIV, with 27% reporting no current partner and 56% reporting 0-1 recent sexual partners. 35% and 15% participants reported "always" using condoms for vaginal and anal sex respectively. Previous PrEP awareness was low at 30% (95%CI=23-39%), but acceptability was fairly high at 50% (95%CI=41-59%). Primary reasons for disinterest in PrEP were side effects (56%), low perceived HIV risk (46%), and disinclination towards regular HIV testing (30%). PrEP acceptability was associated with being in closed (vs. open) relationships ($\mathbf{OR}_{adj}$=2.98; 95%CI=1.03-8.68) and younger age ($\mathbf{OR}_{adj}$=1.05 per year decrease; 95%CI=1.01-1.09), but no significant relationship was seen with HIV-related stigma (OR_{adj}=1.70; 95%CI=0.65-4.47), ability to pay monthly bills (OR_{adj}=1.50; 95%CI=0.65-3.47), access to family doctor (OR_{adj}=0.79; 95%CI=0.29-2.11), no/low HIV risk perception (OR_{adj}=0.72; 95%CI=0.27-1.92), and previous diagnosis of sexually transmitted infections (OR_{adj}=0.46; 95%CI=0.16-1.33).

Conclusion: Despite modest prior knowledge of PrEP, many heterosexual ACB adults in Toronto we engaged appear amenable to PrEP use. Interestingly, closed relationship status was an important predictor of willingness to use PrEP, however, more research is required. PrEP side effects and perceived lack of HIV risk may be significant barriers to PrEP uptake in this population.

KP1.04

Adapting and Pilot-testing the Healthy Love HIV Prevention Intervention with African, Caribbean and Black Women in Community-based Settings in Toronto, Canada

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Background: African, Caribbean and Black (ACB) populations are disproportionately impacted by HIV and other sexually transmitted infections (STI) in Canada. Scant research has examined culturally, contextually tailored HIV prevention strategies for ACB women in Canada. The study objective was to adapt the Healthy Love Workshop (HLW), a high impact, theoretically informed HIV prevention workshop for African American women in the U.S., for ACB women in Toronto, Canada.

Methods: We conducted a community-based, multi-methods study that involved a focus group with ACB women (n=9) to adapt the HLW. We then implemented HLW with ACB women (n=80) in 10 community-based settings with

pre-test (T1), post-test (T2), and 3-month follow-up (T3) surveys to assess changes in outcome variables (HIV/STI knowledge, condom self-efficacy, HIV and STI testing, HIV and STI risk perception). We conducted mixed-effects regression to assess pre-and post-test outcome mean differences while adjusting for socio-demographics, and chi-square tests to calculate HIV/STI testing and HIV/STI risk perception differences. Participants (n=29) provided written feedback at T2 and T3.

Results: HLW participants (n=80; mean age: 27.2, SD: 7.9) identified as African (58.8%), Caribbean (30.0%), and other ethnicities (11.2%). Approximately two-thirds had ever been tested for HIV (64.5%) or other STI (66.2%); 36.4% reported a lifetime STI diagnosis. Mixed-effect regression results indicated significant increases in condom self-efficacy ($\beta 2=3.41$, $p<0.009$), HIV/STI knowledge ($\beta 2=4.15$, $p<0.001$), and STI risk perception, $\chi^2(1, N=38),=5.147$; $p<0.050$, from T1 to T3. There were no significant T1 to T3 differences in HIV/STI testing or HIV risk perception. Qualitative feedback revealed increased confidence using condoms, and suggestions for future HLW.

Discussion: Findings highlight the promise of HLW for increasing HIV/STI knowledge and condom efficacy with ACB women in Toronto. The lifetime STI prevalence was higher than general population studies in Canada. Future intervention research should explore innovative strategies to increase HIV/STI testing with ACB women.

KP1.05

What Will it Take? Sexually Positive Relationships Among African, Caribbean, and Black Women Living with HIV

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While advances in treatment have dramatically improved the life-expectancy of women living with HIV (WLHIV), comfort levels and practices within sexual/intimate relationship vary.

Methods: We conducted two focus groups (n=25) with ACB WLHIV in Toronto. A mixed sampling/recruitment approach was used to ensure a broad cross-section of ACB WLHIV. Respondents were screened for eligibility prior to participating in the focus groups. Each focus group was digitally recorded, transcribed verbatim and analyzed using NVIVO software. A thematic analysis was performed to identify, analyze and report themes in data that emerge.

Results:

Social Demographics

25 ACB WLHIV participated: 84% heterosexual, and 84% with children. Baseline descriptive analyses demonstrate that women had been living with HIV for an average of 8.8 years (SD = 1.3), had a mean age of 40.6 years (SD = 5.2). Although the majority of the participants (95.8%) had completed high school education, 37.5% were unemployed and over half of them had an annual income less than $20,000. Participants identified as African (84%), Ethiopian (8%), and Guyanese (8%).

ii. *Themes*

a. Abstinence: After being diagnosed with HIV many women expressed they had large periods of abstinence ranging from 3 to 12 years. Trauma associated with their diagnosis and fear of disclosure led to abstinence.
b. HIV/STI knowledge: Women were very knowledgeable; however they had difficulties negotiating condom use. Some women indicated they use condoms to protect themselves from contracting other STIs and to avoid criminalization of HIV non-disclosure. Dating strategies discussed.

Conclusions and Recommendations: The majority of women were knowledgeable on HIV/STI prevention, but fear of rejection, stigma associated with HIV and criminalization of HIV non-disclosure were major contributors to why some women preferred abstinence. These findings suggest that ACB WLHIV need support services that extend beyond HIV prevention information to enact change and lead sexually positive relationships.

KP1.06

Factors influencing HIV Acquisition among African, Caribbean and Black Women Infected with HIV Post-migration

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Background: MSAFIRI, a two-phase study to characterize HIV infection post-migration among African, Caribbean and Black (ACB) populations found that over a third of infections are acquired after arrival in Canada but very little is know about factors influencing their risk of HIV acquisition.

Objective: To highlight factors influencing HIV acquisition among ACB women post-arrival/Canadian born.

Methods: One-on-one quantitative interviews were conducted with 108 ACB men and women who had acquired HIV post-arrival/born in Canada who were accessing clinical care. Participant recruitment was done in five HIV clinics in Ontario, four in Toronto and one in Ottawa. We

report overall patterns and risk factors for HIV acquisition among ACB women.

Results: Of the 108 participants, heterosexual/straight women made up a notable proportion (26%) of ACB people infected post-migration.

Heterosexual/straight women were significantly more likely to never use condoms (60%) compared to gay men (35%) and straight men (44%); Women were also most likely to be able to name a partner who was likely the source of their infection (82%, vs 66% overall, 65% for gay men, 54% for straight men, and 63% for bisexual men); Women's likely source partner of their infection was most likely to be their regular partners (91%); and the most common reason for not using condoms with one's likely source partner was that the partner did not prefer to use condoms. Seventy-five percent of women listed this as the reason for not using condoms. Though only a small number of participants were aware of their partner's HIV-positive status, women were the least likely to know.

Conclusions: HIV infection post-migration is preventable based on resources provided to support HIV prevention in ACB communities in Ontario. Above factors highlight the need to focus on this subset of women that may be missed in general prevention services for ACB women.

Key Populations: HIV Prevention and Treatment Interventions by, with, and for Indigenous Communities

Populations clés : Interventions de prévention et de traitement du VIH, par, avec et pour les collectivités autochtones

KP2.01

Doing Research in a Good Way: Decolonizing the Research Process

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Background: The AHA Centre and CAAN (The Canadian Aboriginal AIDS Network) understands research as an academic process that helps us to answer important questions while bringing positive change to our communities; we understand research as a sacred undertaking that hleps to show us connections between the spiritual and physical worlds. By treating research as a ceremonial practice, we can incorporate Indigenous world views and knowledges to guide us in decolonizing the research process.

Our Approach: *Doing research in a good way* explores how relationship building and meaningful engagement and dialogue teaches us about world views, principles and protocols of community partnerships. *Doing research in a good way* respects and incorporates Indigenous knowledges to guide the research. It positions Elders as guides, as we, the researchers work towards understanding how to embark on and conduct research that is respectful of Indigenous knowledges in working with Indigenous communities.

Findings: Relationship and relational accountability are at the very heart of the phrase *doing research in a good way*. *Doing research in a good way* is mindful that as researchers, we are choosing to embark on a journey with both the Indigenous and non-Indigenous community and other members of the research team. It ensures that respectful engagement is done with the Indigenous community and forefronts Indigenous knowledges and ways of knowing. Further considerations include: creating opportunities for learning, growing, creating meaningful work, acknowledging relationships, and privileging community voice.

Implications: Research *done in a good way* can positively impact communities without causing lasting harm. It can bring researchers and academics closer to communities and create a reciprocal relationship where Indigenous and western knowledge systems can work in together in creating applicable and constructive change.

KP2.02

Visioning Health II: Evaluation and Assessment of a Culturally-Grounded and Arts-Informed Health Intervention for HIV-Positive Indigenous Women

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Background: Elder Art Solomon once said that when Indigenous women pick up their medicine bundles, our nations will begin to heal. In the context of Visioning Heath II, a culturally-grounded, strengths-based, arts-informed and community-based participatory intervention project by, for and with HIV-positive Indigenous women in seven sites across Canada, HIV-positive Indigenous women are doing just that.

Design: Visioning Health II is a 'nested' research project with two goals: 1) to conduct descriptive research on the meaning, experience and intersection of health, culture and gender in the lives of HIV-positive Indigenous women, and 2) to develop and test the Visioning Health model as a positive health intervention, including assessing Visioning Health processes and Visioning Health influences, on the self-defined health of positive Indigenous women participants. In the first phase of our project, in collaboration with positive Indigenous women and Indigenous community partners, we selected and adapted four instruments that best reflected the impact of Visioning Health

on participants: the Awareness of Connected Scale, the Pearlin Mastery Scale, the Communal Mastery Scale, and the MOS Social Support Scale. Using a pre- and post- intervention design with a three-month follow-up, we tested these instruments in three sites with a total of 34 positive Indigenous women.

Results: While the full Connectedness Scale is not statistically significantly, statistically significant positive change can be detected in the subscale Connectedness-Self (p=.08); Connectedness-Peers (p=.002); Connectedness-HIV Community (p=07); Connectedness-Culture (p=.01); and Connectedness - Creator (p = .045). Mastery-Peers (p=.03); Mastery-Friends (p=.03); and Mastery-Home (p=.04), as well as Social Support – Tangible (N=27, p=.007) also show statistically significant change.

Conclusion: The results to date are promising in two ways: first, that the instruments have good face and content validity, are culturally relevant, and appropriate; and second, that Visioning Health is having the anticipated measurable positive influence on HIV-positive Indigenous women.

KP2.03

Implementation of Dried Blood Spots as a Novel Intervention to Improve HIV, HepC and HBV Diagnosis and Clinical Monitoring in Remote First Nations Communities

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Background: Implementation of dried blood spots (DBS) for collecting and testing blood borne infections was piloted in two First Nations Canadian communities. This pilot using DBS in a diagnostic capacity is the first of its kind in Canada. This simple method for collecting whole blood doesn't require a trained phlebotomist, is less invasive to the patient, can be collected outside a traditional health care office, and can be stored and shipped at room temperature.

Methods: The local Indigenous Chief and elders were engaged to ensure that all aspects of this intervention were delivered in a traditional and culturally appropriate manner. This model of community engagement included the training of local Indigenous healthcare workers at the NML-NLHRS laboratory in Winnipeg or within a community. These interventions were approved by Health Canada's Research Ethics Board.

Results: Several wellness days or testing drives were identified where healthcare workers would collect DBS from the community. After the blood was allowed to dry, the cards were sent to the NLHRS for serology and molecular testing for HIV, HepC and HBV with reports returning to the Health Authority. This pilot was well received by the community and the healthcare workers. This alternative method of collecting samples for these remote First Nations communities proved effective in allowing community members to be part of the process by receiving DBS training and performing DBS collection. It also allowed flexibility in sending the samples to the laboratory by storing the DBS samples and shipping them in batches.

Conclusion: This evolving community engagement based model addresses empowerment, stigma and reduction in health inequities in First Nations communities. The NLHRS plans to expand DBS testing for blood borne infection in several other remote First Nations communities by offering training for DBS preparation and collection.

KP2.04

"Perfectly Imperfect": Using Arts to Meaningfully Engage HIV-Positive Indigenous Women in Community-Based Participatory Intervention Research

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As one of eight sites nationally, Visioning Health II - British Columbia was a mixed-method, culturally-grounded, strengths-based, and community-based participatory intervention research project that engaged 12 HIV-positive Indigenous women from across the province in a 5-day arts-based retreat-style group research process on the meaning, experience, and intersection of health, culture and gender. The retreat was held at a First Nations owned and operated resort, co-facilitated by two HIV-positive Indigenous women, and supported by local Indigenous Knowledge Keepers, a master birch bark basket maker, community partners, and researchers from the Visioning Health national team. Using birch bark baskets as our medium, women participated in a research sharing circle on the meaning of health, culture and gender in their lives, received baskets teachings from traditional basket makers, made their own baskets, participated in a second research sharing circle on the meaning of their baskets, and participated in culture and land-based activities hosted by the local community. We finished the retreat with a third sharing circle on project evaluation and a celebration. The women also completed pre-and post- retreat questionnaires to assess outcomes. The process of making baskets was more challenging than the women expected but also more rewarding. Once completed, they identified with their baskets in highly personal ways that reflected their gender, Indigeneity, and positive identity, including, "perfectly imperfect [just like me]" and "stitch by stitch I come together with love and support and my flaws become my strengths and are beautiful". Project evaluations indicate that women experienced healing through the Visioning Health process. They also expressed their strong desire for

more culturally-grounded opportunities to connect with other HIV-positive Indigenous women. In this presentation, we will outline the culturally-grounded process we used to engage HIV-positive Indigenous women in art-making as a health intervention, and share findings from our research and evaluations.

KP2.05

Strength, Masculinities, and Sexual Health (SMASH): Developing a Strengths-based HIV/STI Prevention Program for Indigenous and Northern Young Men in the NWT

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Background: The Northwest Territories (NWT) has high rates of STIs. NWT males have a reported age of sexual debut of 14 years old, and experience more mental health challenges (substance use, depression) than other Canadians. Social and health disparities should be contextualized within a history of colonization, income disparities, and limited social and health resources in Canada's North. Strength, Masculinities, and Sexual Health (SMASH) was developed in 2016 through extensive community and youth consultation. The study objective was to explore young men's experiences of participating in SMASH Peer Leader training.

Methods: We held a 10-day land-based training with young men from 18 NWT communities that included cultural arts activities (drumming, Inuit/Dene games) and interactive sexual health programming. We conducted a brief socio-demographic survey and 2 focus groups that were analyzed using thematic analyses.

Findings: Participants (n=21) were mainly Indigenous (76.2%) and 13-18 years (mean 15.5, SD1.8); 85.7% identified as heterosexual and 9.5% as bisexual. 42.9% engaged in sexual practices and were currently dating. Among Indigenous participants, 19% of their parents and 42.9% of grandparents attended residential schools. Participants acquired new knowledge and skills in six domains: 1) sexual health, focusing on HIV/STI knowledge and safer sex practices; 2) leadership skills and capacity; 3) communication skills, focusing on solutions and becoming role models; 4) redefinition of masculinity to challenge traditional notions of strength, emotional openness, empathy, attitudes towards mistakes, and healthy relationships; 5) connection with Indigenous history/culture; and 6) personal growth, including self-discovery and confidence.

Discussion: Findings demonstrate the benefits of SMASH's Peer Leader training for increasing HIV/STI knowledge, and for building leadership, communication, knowledge of self and Indigenous community, and new conceptions of strength and masculinity. These elements of participant growth reflect the promise of a strengths-based, contextually and culturally grounded, holistic approach to HIV/STI prevention with young Northern men.

KP2.06

First Nation Resiliency: One Community Takes on An Epidemic

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Saskatchewan has had the highest rates of HIV and Hepatitis C (HCV) in Canada for nearly 10 years. Indigenous peoples account for the majority of these infections and in particular, First Nation communities have been hardest hit with rates comparable to African nations. Despite the ongoing epidemic, tremendous leadership and work is being done in First Nation communities to address and stop this epidemic.

The 'Know Your Status (KYS)' program, developed in and by Big River First Nation (BRFN) in 2011, is a key initiative developed to address HIV and HCV on reserve. This community-led program delivers comprehensive care, treatment and case management for individuals living with HIV or HCV in a culturally safe environment. Education is provided in schools, at band meetings and community events are providing on an on-going basis by local health care providers. Testing is provided in the community, in schools and mental health and addiction services are locally developed and provided. Partnership between community and health providers has led to successful initiatives.

This program has delivered over thirty community presentations and education events. In the summer of 2017 alone, over 300 band members were tested for HIV and HCV. 94% of HIV positive individuals are on treatment and 92% have undetectable viral loads. Moreover, a HCV micro-elimination program has begun with a test and treat model and currently over 20 individuals are on HCV therapy.

Big River First Nation has achieved the 90/90/90 objectives. This community led program has been shared throughout Saskatchewan and BRFN has now become a successful hub for 6 other First Nations through a mobile unit. This First Nation led and developed approach is a successful model to the HIV epidemic in Saskatchewan. This presentation will share the learning's and outcomes of the KYS project.

Key Populations: Intersecting Vulnerabilities Among People Who Use Drugs

Populations clés : Vulnérabilités croisées entre personnes utilisatrices de drogues

KP3.01

Addiction Treatment Benefits of Antiretroviral Exposure and Adherence Among HIV-Positive People Who Use Illicit Drugs in Vancouver, Canada

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Background: The individual- and community-level benefits of progression along the HIV care cascade are well established. However, little is known about the benefits of initiating antiretroviral therapy (ART) and achieving optimal adherence on addiction treatment among HIV-positive people who use drugs (PWUD).

Methods: Data were derived from a long-running prospective cohort of PWUD in Vancouver, Canada, a setting of universal access to no-cost HIV treatment, linked to comprehensive HIV clinical monitoring and ART dispensation records. A series of generalized linear mixed effect models were developed to examine whether initiating ART and achieving optimal ART adherence, defined as ≥95% in the previous 180 days, were associated with initiating addiction treatment, specifically methadone maintenance treatment (MMT). Sensitivity analyses with lagged ART exposure and adherence variables examined the temporal sequencing of ART engagement on our outcomes of interest.

Results: Between December 2005 and November 2016, of 918 eligible HIV-positive PWUD, the median age was 42.8 (IQR: 36.4 – 48.3), 34.5% were female, and 525 (57.2%) achieved ≥95% adherence at least once during follow-up. In multivariate analyses, ART exposure was positively associated with addiction treatment initiation (adjusted odds ratio [AOR]=2.35; 95% confidence interval [CI]: 1.45–3.80) and MMT initiation (AOR=3.14; 95% CI: 1.84–5.37). Lagged ART exposure was positively associated with MMT initiation (AOR=2.09; 95% CI: 1.13–3.87). Becoming optimally adherent was positively associated with addiction treatment (AOR=1.31; 95% CI: 1.02–1.69) and MMT initiation (AOR=1.77; 95% CI: 1.30–2.42) in lagged analyses.

Conclusions: These findings suggest that initiating ART and becoming optimally adherent increase the likelihood of initiation to addiction and methadone maintenance treatment among HIV-positive PWUD. These results suggest the potentially important benefits of engaging in HIV care beyond its direct impact on improved HIV-related clinical outcomes and support the continued scale-up and early initiation of ART among key affected populations.

KP3.02

"You're not gonna stop using 'cause you're in the hospital": Accounts From People Living With HIV/HCV Who Use Drugs and From Providers About Hospital Substance Use

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Background: People who use drugs (PWUD) have higher rates of emergency room visits and hospital admissions, and may encounter stigma, perceive receiving substandard care, and leave hospital before discharge. This is especially concerning for PWUD with complex health needs, including those with or at risk for HIV. Few studies have examined illicit drug use in acute settings despite unmanaged withdrawal being a predictor of leaving hospital early.

Methods: We conducted semi-structured interviews with adults living with HIV and/or HCV who self-identified as PWUD, and with HCP on in-patient hospital units in Toronto and Ottawa to understand what leads to on-premise use. PWUD described if and how they used substances during hospital stays, staff interactions and experiences leaving before discharge, while HCP described attitudes and experiences providing care to PWUD and what, if any, related institutional policies exist. Interviews were audio-recorded, transcribed and analyzed inductively.

Results: 24 PWUD and 26 HCP participated. PWUD used substances in hospital to manage physical withdrawal, psychological withdrawal and pain. HCP awareness of substance use varied greatly. HCP described ignoring substance use to avoid confrontation while PWUD described feeling abandoned when HCP were inattentive. PWUD described increased monitoring, including equipment confiscation following drug use detection and indeed described tactics to conceal use. HCP concerns about overdose or breaches in trust led to terminating hospital prescriptions (i.e. benzodiazepines or opioids) and discharge. Harm reduction approaches, such as substitution dosing (i.e. with prescription opioids) were less common. At the time of study, no institutional policies existed to guide HCP in managing on-premise use.

Conclusion: Optimizing length of stay for all PWUD is crucial, especially those with complex health needs. These findings highlight the lack of consistency in approach to on-premise use and indicates supportive institutional policies and further training for HCP working with PWUD may be warranted.

KP3.03

HIV Incidence Among Men Who Have Sex with Men and Inject Drugs in Vancouver, Canada

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Background: A majority of new HIV infections in Canada occur among men who have sex with men (MSM) and people who inject drugs (PWID). Few data are available on HIV incidence among individuals belonging to both of these key populations (MSM-PWID). We sought to describe HIV incidence among MSM-PWID in Vancouver and to identify whether sex with men was associated with seroincidence after considering potential drug-related and sociodemographic confounders.

Methods: Data were drawn from the Vancouver Injection Drug Users Study (VIDUS), an open prospective cohort of HIV-negative PWID. Participants were included in this analysis if they were male, recruited between May 1996 and June 2014, and attended at least two follow-up visits. Participants were categorized as MSM if they reported sex with another man at least once over the study period, or identified as gay at baseline. We used Kaplan-Meier analyses and extended Cox regression to compare time to HIV seroconversion between MSM and non-MSM PWID.

Results: Of 1131 HIV-negative male PWID, 8.6% (n=97) were MSM. HIV incidence among MSM was 1.87 per 100 person-years (95% CI= 1.07 – 3.04), versus 1.19 (95% CI= 0.95 – 1.47) among non-MSM. In bivariable Cox regression, MSM status was associated with time to HIV infection (Hazard Ratio [HR]= 1.81; 95% CI= 1.08 – 3.03). MSM status was not significantly associated with HIV incidence after adjustment for daily cocaine injection and syringe borrowing (Adjusted HR= 1.33; 95% CI= 0.78 – 2.28), the primary drivers of injection-related HIV risks in this setting.

Conclusion: Among male PWID in our sample, MSM were at higher risk of HIV seroconversion, which appeared to be driven by drug-related risks. Additional research on sexual identity, behaviour, and HIV risks among MSM-PWID over time would support the development of interventions to reduce their drug-related risks, as well as concurrent sexual risks.

KP3.04

Tenant-led Interventions: Addressing Overdose, HIV, and Other Harms Associated with Injection Drug Use in Single Room Occupancy Hotels

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Background: The physical, social, and structural environments of single room occupancy (SRO) hotels create multiple risk environments for people who use drugs, including overdose, HIV transmission, and housing instability. This study examined the acceptability, feasibility, and implementation of a tenant-led naloxone training and distribution in-reach intervention in privately-owned SRO hotels with high overdose rates.

Methods: Semi-structured qualitative interviews were conducted with 20 tenants from participating SROs. Focus groups were conducted with 15 peer workers who led intervention in their respective SRO hotels. On-site ethnographic observation was also conducted. Interviews and focus groups were transcribed and analyzed thematically.

Results: This tenant-led program demonstrated a high level of acceptability, with participants describing the urgent need for a harm reduction intervention amid the frequency of overdoses in their SROs. The intervention was also successful in enhancing harm reduction knowledge and skills of participants and in reaching isolated tenants. However, there were social and structural barriers to program feasibility in some SROs (e.g., stigma, anti-harm reduction rules, lack of landlord acceptance/support). Further, a lack of availability of harm reduction supplies (e.g., syringes, cookers, needle disposal bins) at multiple SROs affected other associated risks, such as HIV transmission. The intervention was successful in its reach, although participants discussed a lack of emotional support in responding to frequent overdoses and other drug-related harms, leading to burnout and vulnerability.

Conclusion: Our findings suggest that this overdose response intervention was affected by social- and structural-environmental constraints that impacted feasibility and implementation. Given that the environmental context of SROs creates multiple risk environments, tenant-led overdose response interventions that integrate complementary HIV-focused interventions (e.g., availability of harm reduction supplies, safer drug use education) are needed to address the multiple social-structural challenges that negatively impact the health outcomes of people living in SROs.

KP3.05

The Cedar Project: Intergenerational Child Welfare Experiences and HIV Health and Wellness Among Young Indigenous People Who Use Drugs

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Background: As residential schools closed, wide-scale apprehension of Indigenous children into the child welfare system began and continues to this day. Wellbeing is eroded and undermined when Indigenous children are forcefully removed from their families and communities. This study explored how intergenerational child welfare experiences shaped HIV health and wellness from the perspective of young Indigenous people who use drugs living with HIV.

Methods: This qualitative study took place within The Cedar Project, a cohort involving young Indigenous people who use drugs in Vancouver and Prince George, BC. In-depth interviews addressing experiences of HIV treatment involved 12 participants enrolled in the Cedar HIV Blanket Program in Spring 2016. Interviews were open-ended to allow participants' experiences to direct the interview and enable them to share stories they felt were important. Interpretive description identified themes and sub-themes.

Results: Child welfare experiences were a central concern for all but two participants and a topic that arose frequently as we spoke about HIV-related health and wellness. Eleven participants were apprehended into the child welfare system themselves. In addition, eight were parents, all of whom reported that the Ministry of Children and Families was/had been involved with their own children. Themes highlighting intersections of child welfare experiences and HIV included: (1) impact of participants' removal from their families on long-term health and wellbeing; (2) re/connecting with parents, children and other family (working to 'stitch their quilt back together'); (3) stress and demands of maintaining/regaining custody of children; and (4) intersections of substance use, child welfare experiences, and HIV. Traditional wellness practices were valuable and complicated.

Conclusions: Services that seek to support HIV health and wellness among young Indigenous people who use drugs must acknowledge and address the ongoing impacts of intergenerational child welfare experiences. Parenting must be considered a critical part of culturally-safe, trauma-informed care.

KP3.06

Examination of the Effects of Repeated Solvent Use on the Immune System: Implications for HIV Infection

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Background: Inflammation is a known risk-factor for HIV infection. Studies have shown active innate immune system correlates with higher HIV acquisition. Solvent use involves inhalation readily available lipid-soluble substances (e.g. lacquer thinner, hairspray, rubbing alcohol) resulting in psychoactive effects. Clinical reports of long-term solvent use have linked this practice to increased tracheal inflammation. Since inflammatory activity of the innate immune system is a known risk factor for HIV infection, we were interested in the inter-relationship between solvent use, immune system function, and HIV infection. In collaboration with Sunshine House, a community-based organization working with street-involved Winnipeggers, we engaged solvent using community members who were interested in determining effects of solvent use on their health and HIV risk.

Hypothesis: Solvent users will have greater immune activation profiles and greater risk for HIV acquisition than matched non-solvent users.

Objectives: Assess the impact of solvent use on, immune activation, Immune cell phenotype, and function.

Methods: 14 solvent users and 13 matched controls (solvent non-users from the same community) were recruited and enrolled in the pilot study. Plasma cytokines, chemokines, and immune modulatory hormones were assessed by bead assay. Peripheral blood immune cell activation was assessed using flow cytometry.

Results: Our study found that solvent users had higher levels of innate immune activation characterized by activated natural killer cells denoted by fewer CD38 positive NK cells (median 71.35 vs 86.6, p=0.026). Solvent users exhibited increased pro-inflammatory chemokine MIP-1β (median 75.14 vs 47.89, p=0.048) compared to controls and had lower levels of the thyroid hormones, T3 and T4, (median 0.14 vs 0.23, p=0.002 and median 1.58 vs 1.65, p=0.016 respectively) which are required for efficient metabolism necessary for efficient immune response.

Conclusion: Solvent users exhibit higher levels of innate immune activation and lower thyroid hormones than solvent non-users potentially increasing their risk for HIV acquisition.

Key Populations: New Directions in HIV Prevention and Treatment Among Sexual and Gender Minorities

Populations clés : Nouvelles orientations dans la prévention du VIH et son traitement chez les minorités de genre et sexuelles

KP4.01

Determining the Conditions Necessary to Eliminate the HIV Epidemic Among MSM in British Columbia

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Background: The HIV epidemic continues to disproportionally affect the gay, bisexual and other men who have sex with men (MSM) population. Based on the recent study focused on the HIV epidemic among MSM in Denmark, a setting similar to BC where treatment coverage and viral suppression is high, the authors predicted that Treatment as Prevention (TasP) alone will not lead to HIV elimination. We evaluated how TasP and pre-exposure prophylaxis (PrEP), if used in combination, could potentially lead to disease elimination among MSM in BC.

Methods: We designed a compartmental mathematical model that simulates transmission dynamics of the HIV epidemic among MSM in BC. We sub-divided the MSM population into four HIV infection risk sub-groups based on the US Centre for Disease Control HIV Incidence Risk Index for MSM (HIRI-MSM) and data from the Momentum Health Study, a cohort of both HIV-positive and HIV-negative MSM in Vancouver (BC) and surrounding areas. Several measures of intervention impact were examined, particularly the World Health Organization (WHO) incidence threshold (1 HIV new case per 1000 susceptible MSM) and having a Control Reproduction Number (Rc) below one. TasP optimization was simulated by the percent reduction in time that HIV-positive individuals remain unsuppressed along the care cascade, and PrEP by targeting high-risk (HIRI-MSM≥25) susceptible MSM.

Results: Optimizing only PrEP would require 100% coverage of the HIRI-MSM≥25 population (approximately 6000 HIV-negative MSM), while also requiring between 1% TasP optimization (Rc threshold) to 5% TasP optimization (WHO incidence threshold). Optimizing TasP by 30% would instead require only between 24% (WHO incidence threshold) and 27% PrEP coverage (Rc threshold).

Conclusions: Based on the Rc and WHO incidence threshold estimates, HIV elimination could be achieved through a combination of optimized TasP and targeted PrEP to the highest risk MSM.

KP4.02

The Sexual Confidence Study: Cognitive Behavioural Therapy for Social Anxiety and HIV Prevention for Gay and Bisexual Men

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Background: Social anxiety is positively associated with condomless anal sex (CAS), the main route of HIV transmission among gay and bisexual men (GBM). Social anxiety is highly responsive to cognitive behavioural therapy (CBT) and as such may be a promising treatment focus for integrated HIV prevention interventions. The treatment, 10-sessions of individual CBT-based therapy, targeted social anxiety in sexual situations, and social anxiety in the context of problematic alcohol use, both of which may represent significant pathways to CAS.

Methods: In an open-trial design we examined the effectiveness of the treatment comparing the proportion of participants reporting (1) CAS with a serodiscordant partner (SDCAS) in the last 3 months, and (2) hazardous/harmful alcohol use at four time-points: pretreatment, posttreatment, and 3- and 6-month follow up. We also examined change on psychosocial measures of social anxiety, loneliness, and depression.

Results: Twenty participants completed 6-month follow up assessment. We observed a reduction in SDCAS at 6-month follow-up compared to pre-treatment (50% from 100%; Cochran-Armitage Test for Trend Chi-Sq=10.08; p=0.002) and in hazardous/harmful alcohol use (45% from 75%; Cochran-Armitage Test for Trend Chi-Sq=5.82; p=0.02). We also observed reductions on each of the psychosocial measures (p <0.05).

Table : Comparisons of condomless anal sex, harmful Alcohol use, social Anxiety, interaction anxiety, social phobia, depression and lonelieness over four assessment points, Sexual Confidence Study (N=20)

Assessment Point	SDCAS (%)	Harmful Alcohol Use (%)	Social Anxiety (Mean Score)
Pre-TRT	100.00	75.00	62.95
Post-TRT	47.37	63.16	49.68
3M FU	42.11	31.58	45.95
6M FU	50.00	45.00	42.29

Conclusion: This program is the first to use CBT for social anxiety for GBM at risk for HIV via CAS. Participants had significantly reduced risky sex, hazardous and alcohol use and psychosocial distress. The study provides good preliminary

evidence suggesting benefits of integrating mental health treatments with HIV prevention for GBM at risk for HIV.

KP4.03

The HIV Clinical Care Cascade and Virologic Response Over Time among Transgender People Living with HIV in a Large Multi-site Canadian Cohort

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Background: Transgender (trans) people are a key HIV priority population. The current study is one of the first to characterize the HIV clinical care cascade and viral response over time for trans people in Canada.

Methods: The Canadian HIV Observational Cohort (CANOC) provided data for this study; participants were HIV-positive and had started antiretroviral therapy (ART) since 2000. For multivariable analyses, trans people were matched with non-trans comparison groups using a 1 trans person: 2 non-trans men: 2 non-trans women scheme. Penalized likelihood Cox proportional hazards models examined the relationship between gender and time to virologic outcomes. Kaplan Meier plots modeled time to initial suppression and rebound.

Results: Of the trans sample (n=43), 91% were from British Columbia and 9% were from Ontario. 21% were White, 2% Black, 26% Indigenous, and 51% were of other or unknown race/ethnicity. The proportion of trans people was similar to that of non-trans people at each cascade step (Table 1). Trans people were relatively well engaged in care and on ART, though largely unsuppressed. Virologic outcomes were overall not significantly different between groups. In Kaplan-Meier plots, time to suppression was longer for trans people than non-trans men, and longest for non-trans women.

Table 1. HIV Clinical Care Cascade by gender, at last study period

	Retained in care, N (%)	On ART, N (%)	Virologically suppressed, N (%)
Gender			
Non-trans man	67 (88.16)	72 (94.74)	7 (9.21)
Non-trans woman	65 (85.53)	72 (94.74)	14 (18.42)
Trans person	34 (89.47)	36 (94.74)	6 (15.79)

Conclusions: In this initial study, such low suppression is likely related to skew to early ART initiation era in the sample. Improved gender ascertainment in clinical cohorts is needed to facilitate further research with larger sample sizes and better characterize HIV clinical care and virologic outcomes for this priority population.

KP4.04

Acceptability and Preferences for HIV Pre-Exposure Prophylaxis (PrEP) among a Respondent-Driven Sample of MSM at High-Risk in India: A Discrete Choice Experiment

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Background: India has the third largest HIV epidemic in the world, with prevalence 20-fold higher among men who have sex with men (MSM) than the general population. Despite its proven efficacy, Pre-Exposure Prophylaxis (PrEP) is not yet approved in India. In order to guide government policy on PrEP implementation, we assessed PrEP acceptability and preferences among MSM.

Methods: From January-April 2017, we recruited HIV-negative MSM using respondent-driven sampling initiated in cruising areas and community-based organizations in Chennai and Mumbai. A tablet-administered survey interview assessed demographics, sexual risk behaviours and PrEP acceptability, with a discrete choice experiment using pictorial cards on the tablet screen to assess preferences. We used logistic regression to identify demographic and behavioural correlates of acceptability, and modeled marginal willingness-to-pay (mWTP) for attributes of PrEP derived from a conditional logit model using the Krinsky-Robb procedure with 5,000 replications.

Results: Participants (n=200) (mean age=26.6y [SD=6.6]; 19.5% ≤high-school education; monthly income, mean=12,280 rupees [~CA$245][SD=6,951]; 19.5% heterosexually married), reported multiple (mean=6.0, SD=4.3) partners and 63.6% inconsistent condom use (past month). 77.0% would use PrEP immediately upon availability. Acceptability was associated with inconsistent condom use (AOR = 3.16, 95% CI,1.03-9.70, p=.04), high perceived HIV-risk (AOR = 3.41, 95% CI,1.07-10.84, p=.03), and inversely with being married (AOR = .25, 95% CI,.07-.80, p=.02). mWTP indicated highest estimates for (high) efficacy, no (vs. minor) side-effects, intermittent (vs. daily) dosing, with no preferences for government vs. private hospital. 62.0% endorsed "PrEP would avoid the hassle of

using condoms," significantly associated with acceptability (χ^2=15.9, p<.001).

Conclusions: High PrEP acceptability among MSM in India indicates substantial opportunities to support combination prevention. Tailored interventions for the many heterosexually married MSM, and intermittent dosing options subsidized through government hospitals, may support uptake. Possible reductions in condom use signal the need for interventions that address STI risks and support PrEP adherence.

KP4.05

PrEP-use Experience Among Gay, Bisexual, and Other Men Who Have Sex with Men (gbMSM) in Montreal

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Background: Pre-exposure prophylaxis (PrEP) is an effective HIV prevention strategy. Canadian guidelines have been published to identify those who may benefit from PrEP. We describe PrEP-use and user-experiences among Engage study participants in Montreal.

Methods: Engage is a cross-sectional study in Montreal, Toronto and Vancouver. We recruited cisgender and transgender men ≥16 years who had sex with another man in the past 6 months via respondent-driven sampling (RDS) to undergo HIV/STI testing and a computer-assisted self-interview. Questionnaire items were developed to measure user-perspectives of the Levesque model (2013) of access to health services. The current analysis explores the last 2 steps of access (ability to pay for and to use) PrEP, and the proportion of participants meeting the 2017 Canadian PrEP Guidelines. Proportions are not RDS-weighted.

Results: As of September 2017, 75% (384/514) of participants were confirmed HIV-negative, and 13% (49/384) of HIV-negative participants reported ever using PrEP. Among these, 84% met the recommendations for PrEP. The median age of ever-PrEP-users was 39 years and 67% had a university degree; 55% reported current PrEP-use; 65% reported ever using PrEP continuously, 12% used on-demand, and 22% used both; 92% had their last course of PrEP prescribed by a doctor; 78% accessed PrEP at a clinic specialised in sexual health. At their last prescription, 89% reported having the opportunity to raise concerns about taking PrEP, however 47% felt they had to convince the health professional to obtain a prescription; 76% spent <150$ for a one month's course of PrEP. Among ever-PrEP-users, 90% were satisfied with their overall PrEP experience.

Conclusion: Preliminary findings from a population-based sample suggest most men who have taken PrEP met Canadian guideline recommendations, accessed it through a specialized clinic, and are satisfied with their experience. Expanding the range of professionals providing PrEP might contribute to further scale-up.

KP4.06

Towards Inclusive and Meaningful Community Engagement in LGBTQ2S HIV Research: An Ongoing Dialogue between Research Trainees and Community Partners

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Background: Over the course of three decades, activists have forged Greater and more Meaningful Involvement of People living with HIV/AIDS in the research process (commonly referred to as GIPA/MIPA principles). Application of GIPA/MIPA has yielded a variety of models of community-based research (CBR). In the context of a growing number of LGBTQ2S-focused HIV research projects, we have begun a dialogue among a group of trainees and representatives from various HIV and LGBTQ2S community organizations, with the ultimate goal of developing materials to support trainee CBR practices.

Methods: Two research trainees began early consultations in summer 2017, culminating in a workshop with 35 participants in November. The workshop included group discussions, focused on four topics: (1) establishing CBR relationships; (2) ensuring alignment between researchers' and communities' visions and values; (3) knowledge translation; and (4) best practices. Consultations are ongoing.

Results: Discussions to-date have emphasized the following principles that must be fundamental to good CBR. Involve community early and at all stages of research, including setting the question and conducting analysis. Communications between researchers and community

must be ongoing and happen before and after results are shared elsewhere. Community needs should drive the CBR project. Consultations have additionally suggested concrete skills-based practices for research trainees, for example: co-writing research plans and communication plans early in the CBR process, and participating in practicums sited at community organizations. Finally, to achieve meaningful CBR, researchers must actively work with traditionally under-represented groups in future LGBTQ2S research projects, specifically centering Indigenous people, people of color, and non-metropolitan residents.

Discussion: While GIPA/MIPA principles have been established for over 20 years, there is a demand for further training for HIV research trainees. We propose specific lessons and actions for trainees to incorporate CBR into their research approaches at an early stage.

Basic Sciences: Host and Viral Genetics, HIV immunology

Sciences fondamentales : Génétique de l'hôte et du virus, immunologie du VIH

BS3.01

HIV-1 Nef Upregulates and Interacts with the Inhibitory Receptor Tim-3

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Introduction: Progression to AIDS during HIV-1 infection is characterized by immune activation and severe T cell dysfunction. Prolonged immune activation drives the upregulation of multiple T cell inhibitory receptors, generating an exhausted pool of virus specific T cells. The expression of inhibitory receptors on virus-specific T cells positively correlates with viral loads; however, factors mediating the upregulation of inhibitory molecules remain largely unknown. Given that exhausted T cells have diminished cytotoxic potential, reduced poly-functionality and lower proliferative capacity, we hypothesized that HIV exploits this situation to evade the host immune response.

Results: Here, we examined the role of the HIV-1 proteins Nef and Vpu in mediating T cell exhaustion. HIV-1 infected blood mononuclear cells displayed higher frequencies of surface programmed death-1 (PD-1) and T cell Immunoglobulin mucin containing domain-3 (Tim-3) compared to uninfected controls. We demonstrated that the Nef specifically enhances surface expression of Tim-3 via the $Nef_{LL164/154}$ motif. Upon profiling the phenotype of HIV-1 infected $CD4^+$ T cells, we observed a higher frequency of Tim-3 in the naïve and central memory compartment. Strikingly, the Tim-3 positive population exhibited an activated phenotype and robustly secreted regulatory cytokines such as IFN-γ and IL-2. Using, co-immunoprecipitation assays, we established an interaction between Nef and Tim-3 and further utilizing a bimolecular fluorescence complementation assay we visualized this interaction. Specifically, the cytoplasmic tail of Tim-3 was essential for Nef:Tim-3 complex formation. Finally, we defined a novel role for Nef in mis-localizing Tim-3 away from the LAMP-1 positive degradative compartment.

Conclusions: Results from this study highlight a key role for HIV-1 Nef in dominantly driving T cell exhaustion. Our data highlights the prospect of reversing T cell anergy in HIV-1 infection using therapeutics targeting Nef.

BS3.02

Genomic Study of >3,000 Individuals Identifies a Novel Locus of HIV Regulation in Populations of African Descent

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HIV set point viral load (spVL) correlates with rate of disease progression and transmission. Genome-wide association studies have demonstrated that ~25% of the variability in spVL is due to host genetics, with the HLA and CCR5 regions being the primary drivers. However, previous studies have focused on individuals of European ancestry, thus assessing only a fraction of human genetic variation. We sought to address this gap by performing a genetic study of spVL in individuals of African ancestry.

A discovery set of 2,517 African Americans with genome-wide genotyping and spVL data was obtained from four independent studies. We further obtained data for a replication sample of 650 individuals from 4 studies of people from eastern and southern Africa ($N_{combined}$=3,167). Association was tested between spVL and genetic variants by linear regression. Discovery and replication results were combined by meta-analysis.

In the discovery sample, we observed a novel association between spVL and rs77029719 ($p=5.7x10^{-8}$; β=-0.30) which was confirmed in the replication set ($P_{combined}=7x10^{-10}$; $\beta_{combined}$=-0.31). This variant is located on chromosome 1 and thus the association cannot be explained by the known effects of HLA (chr6) or CCR5 (chr3). rs77029719 falls within a lincRNA and shows strong linkage ($r^2 > 0.6$) with several variants across four genes (*CHD1L*, *FMO5*, *PDIA3P*, *PRKAB2*). Bioinformatic analysis showed that rs77029719 regulates splicing and expression of *CHD1L*, which encodes a DNA helicase that interacts with *PARP1*, an enzyme implicated in HIV integration. Importantly, rs77029719 is only observed in populations of African descent, suggesting a population-specific mechanism of HIV control.

We identified an African specific genetic locus that controls HIV replication *in vivo* with a potential role in modulating HIV integration. These findings suggest a new target for anti-HIV drug development and demonstrate the critical need to perform genetic studies in multiple populations.

BS3.03

Network Analysis of Global Diversity In HIV-1 Group M Genomes

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The global HIV-1 pandemic is predominated by viruses of the M group comprising 9 major sub- types. However, a constant accumulation of new inter-subtype recombinants may be reshaping global HIV-1 diversity. Many recombinant forms of HIV-1 may have originated from highly-divergent unclassified ancestors that predate currently-known subtypes. This complex evo- lutionary history is exceedingly difficult to represent with one or multiple phylogenetic trees. Here we analyze a large HIV-1 genome database using an alignment-free network method to examine the global structure of virus genomic variation. We obtained n =7,816 GenBank records with at least 8,000bp coverage of the HIV-1 genome and manually screened the associated publications for laboratory clones, multiply-sampled individuals and sample collection dates, resulting in 3,936 validated genomes. We used a p-spectrum kernel to generate a pairwise distance matrix from the unaligned sequences and converted it into an ad- jacency graph using a distance threshold of 0.93. We used the R package igraph to extract and analyze network characteristics. Using Newman's leading eigenvector method, we identified 7 large (>100 node) network clusters comprising 3,052 (77%) genomes that mapped to the major subtypes A to D, F, G and CRF01-AE. Within clusters, degree sizes declined significantly with collection year, consistent with accumulating diversity centred around founder variants, with more recent nodes at the periphery. Degree sizes of putative recombinants were significantly lower, even after adjusting for sample year (bi- nomial GLM, $P = 1.4 \times 10 -7$). In networks stratified by collection dates, we observed that older networks tended to be more compact with fewer clusters, followed by the emergence of more heterogeneous and less distinct clusters. Our network method provides a simple approach to evaluate hypotheses about global HIV-1 diver- sity, and a potential framework for rapidly selecting vaccine candidates and screening for hyper- mutated isolates.

BS3.04

Gut Mucosal T-cell Immunity and Early Antiretroviral Therapy (ART) Initiation During Acute SIV Infection

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Background: Rapid CD4 T-cells depletion, mucosal inflammation and increased frequencies of immunosuppressive regulatory T-cells (Tregs) within the gut are hallmarks of HIV/SIV infection, beginning in acute phase of infection. Here, we assessed the dynamic of gut mucosal T-cells following early ART initiation in acute SIV infection.

Methods: Nine female Chinese rhesus macaques were infected with SIVmac251. ART cocktail including reverse transcriptase inhibitors (Tenofovir, Emtricitabine), protease inhibitors (Indinavir, Ritonavir), and integrase inhibitor (Raltegravir) was initiated at day 3 post-infection subcutaneously once a day. Four ART-treated monkeys were euthanized at days 11, 14, 27, 35 post-infection. In three monkeys, ART was interrupted at day 53 post-treatment and animals were sacrificed at days 10, 15 and 18 post ART-interruption. Two untreated monkeys were euthanized at days 33 and 60 post-infection. Mucosal cells were freshly isolated via mechanical purification from ileum, jejunum, colon and mesenteric lymph nodes. Mucosal CD4 T-cells were characterized by flow cytometry versus matched peripheral blood.

Results: Early ART initiation resulted in a decreased frequency of total Tregs (FoxP3+) and Tregs expressing immunosuppressive ectonucleotidase CD39 – also known as a marker of immune activation – compared to untreated animals in both blood and gut mucosal tissues. Early ART also reduced the frequency of CCR6+ memory CD4 T-cells, suggesting a lower CD4 recruitment in gut mucosal tissue. Furthermore, early ART diminished CD8+CD39+ T-cells as a cellular marker of immune activation linked to the local viremia within the gut. ART-interruption resulted in an increase in frequencies of total and CD39+ Tregs, CCR6+ memory CD4 T-cells and CD8+CD39+ cells in gut mucosal tissues.

Conclusions: ART initiation within the first few days of SIV-infection of Chinese rhesus macaques improved gut mucosal immunity by decreasing immunosuppressive Tregs, immune activation and CD4 T-cells recruitment, which in turn, could reduce the fuel of local viral reservoirs and inflammation.

BS3.05

Public TCR Clonotype Defined by Dual HLA-B*81 and B*42 Gag TL9Tetramer Cross-reactivity Displays Broad Recognition Against HIV-1 Escape Variants

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Background: HLA-B*81 is associated with control of HIV subtype C infection, while the closely related allele B*42 is not. Both alleles present the immunodominant Gag TL9 epitope, and magnitude of this response correlates with viral load. To examine the role of T cell receptors (TCR) in this process, we characterized TL9-specific TCR in B*81 and B*42 patients.

Methods: TL9-specific CD8 T cells were identified using B*81 and/or B*42-TL9 tetramers. TCR beta genes were sequenced from single sorted cells. Paired alpha genes were determined for selected clones. TCR function was tested using a reporter cell assay where TCR+ Jurkat cells were co-cultured with peptide-pulsed or HIV-infected B*81 or B*42 target cells, and signaling quantified by luminescence. TCR recognition was assessed against all single amino acid TL9 variants and results were compared to HIV subtype C sequences.

Results: Dual-reactive T cells were detected by both B*81- and B*42-TL9 tetramers in 7/9 B*81 and 4/11 B*42 individuals and were associated with lower viremia. Mono- and dual-reactive TCR beta sequences were collected from 6 individuals (798 total; avg. 67/subset). In B*81 individuals, all TCR were highly restricted to TRBV12-3. In B*42 individuals, mono-reactive TCR encoded various V beta genes, while dual-reactive TCR were restricted to TRBV12-3 and enriched for public clones. Functional analyses indicated that B*81 TCR and a dual-reactive public B*42 TCR displayed similar TL9 cross-reactivity profiles and better capacity to recognize HIV escape mutations compared to mono-reactive B*42 TCR.

Conclusions: Results highlight the impact of TCR diversity on T cell-mediated control of HIV. A subset of dual HLA-TL9 tetramer-reactive T cells defined public TCR clones in B*42 individuals that displayed B*81-like features. B*81 and dual-reactive public B*42 TCR showed greater cross-reactivity against TL9 variants, which may contribute to differences in clinical outcome.

Funding: CIHR (CanCure), NIH (BELIEVE), HHMI, Wellcome Trust (DELTAS-Africa)

BS3.06

Targeted Production of Endogenous Anti-HIV Broadly Neutralizing Antibodies

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Over the past few years, researchers have identified a large number of HIV antibodies that have broad and potent neutralization activity. Unfortunately, very limited progress has been made in designing specific HIV immunogens that can elicit a bNAb response. Passive immunization schemes using bNAbs have protected monkeys from simian-human immunodeficiency virus (SHIV) challenge infections. However, due to the short antibody half-life, it requires repeated injections which are not practical as a large-scale human prophylactic vaccine approach. Using gene transfer technology to endow a host with anti-HIV bNAbs genes is now becoming a very attractive strategy. We have constructed a bNAb, VRC01-expressing murine retroviral vector (MIGR) and successfully transduced antigen-specific primary B cells that produce influenza (Flu) hemagglutinin- (HA-) specific IgG from mice pre-immunized with Flu vaccine. We hypothesize that the bNAb expression from the transduced antigen-specific B cells can be modulated by the same immunogen in the preimmunized animal, i.e. after transfusion of the VRC01 transduced B cells back to the Flu-vaccinated mouse, these primary B cells can be specifically activated by another Flu immunization to produce anti-HIV bNAbs again along with the anti-HA antibodies. This elucidates the potential for long-term bNAb persistence in human hosts from a single injection of transduced B cells due to endogenous antibody expression. The Flu vaccine modulates the activation of the bNAb-transduced B cells, allowing for controllable anti-HIV bNAb production in vivo to avoid the side effects of sustained bNAb production while providing protection efficacy.

BS3.07

Statistical and Functional Analyses Reveal Subtype-specific Constraints on HIV Cellular Immune Escape Pathways

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Background: The extent to which viral genetic context constrains HLA-driven immune escape pathways in HIV remains incompletely understood. We combine statistical analyses with *in vitro* functional assessments to investigate HLA-driven adaptation in a population where multiple HIV-1 subtypes co-circulate (Uganda).

Methods: HLA-associated polymorphisms in HIV-1 Gag/Pol/Nef were identified in 200 subtype A1- and 135 subtype D-infected individuals. Polymorphism selection strength was compared *between* subtypes using a phylogenetically-informed logistic regression approach. VsVg-pseudotyped virus stocks expressing parental/mutant subtype A1 or D gag-protease sequences in an NL4.3 backbone were assessed for *in vitro* replication using a multicycle GFP-reporter assay. CD4- and HLA-downregulation capacities of mutant subtype A1 or D Nef sequences were evaluated by flow cytometry.

Results:A total of 83 Gag, 198 Pol and 105 Nef HLA-associated polymorphisms were identified in subtype A1 and/or D at $q<0.2$. Of these, 34% exhibited significant differential selection *between* subtypes ($q<0.1$; $p<0.05$). Some instances of differential selection result from subtype-specific mutational constraints. For example, HLA-B*57:03 strongly selected Gag-T242N in subtype D (Odds Ratio [OR]=250), but not subtype A1 (OR=1.8,p=0.8)(inter-subtype comparison $p=8x10^{-6}$). This is likely because the subtype A1 consensus proline at the adjacent codon 243 is incompatible with T242N: replication is abolished when these residues occur together (p=0.0009) while T242N minimally impacts replication when leucine (the consensus of all other HIV-1 subtypes including D) is adjacent. Other differentially-selected polymorphisms only minimally impact protein function. For example, the HLA-A*74:01-selected Nef X196K mutation, which represents one of the strongest examples of subtype-specific selection (subtype D OR=2.08,$p=3.8x10^{-6}$; subtype A1 OR=-0.4,p=0.7; inter-subtype comparison $p=3.6x10^{-5}$) reduces subtype A1 Nef-mediated CD4 downregulation by only 1% (p=0.03) and enhances HLA downregulation by 10% (p=0.06), suggesting other mechanisms besides mutational constraints contribute to subtype-specific HLA-mediated adaptation.

Conclusions: Mechanistic elucidation of differential immune escape pathways may help identify subtype-specific mutationally-constrained viral regions for vaccine design.

BS3.08

Extensive Host Immune Adaptation in the Saskatchewan HIV Epidemic

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Background: HIV incidence in Saskatchewan is the highest nationwide. Reports of unusually rapid progression have emerged from the province, while accelerated progression among individuals expressing certain HLA alleles, including the typically protective B*51, have been reported in neighbouring Manitoba. Given the documented population-level spread of HLA-associated escape mutations in HIV epidemics globally, and the strong links between acquisition of "immune-adapted" viral strains and poorer clinical outcomes, we hypothesized that HIV adaptation to common HLA alleles, in particular B*51, may be elevated in Saskatchewan.

Methods: We analyzed 1,144 partial HIV subtype B Pol sequences from unique Saskatchewan residents collected between 2000-2016 for drug resistance genotyping, alongside >6500 published Pol sequences from elsewhere in Canada and the USA from the same period, for the presence of 70 published HLA-associated Pol mutations. Overall adaptation levels to 34 individual HLA alleles were also compared; lineage distributions of individual HIV mutations were also investigated phylogenetically.

Results: HIV adaptation to numerous HLA alleles, particularly B*51, was significantly elevated in Saskatchewan. In fact, Saskatchewan's Pol consensus sequence differed from the North American one at 9 codons, 7 of which represented major HLA-associated escape mutations. These mutations are also spreading at significant rates over time in the province. Saskatchewan's HIV molecular epidemiology is also unique, in that >75% of sequences resided within 26 phylogenetic clusters (largest >200). Strikingly,

these clusters are significantly enriched for HLA-adapted HIV strains, indicating that these are being widely and preferentially transmitted provincially.

Conclusions: The observation that Saskatchewan residents are significantly at risk of acquiring HIV that is pre-adapted to host immunity provides a plausible explanation for reports of accelerated progression in the region. Results also identify Saskatchewan as the first North American HIV epidemic featuring significant circulating HLA adaptation. Results underscore the urgent need to expand HIV prevention, testing and treatment in Saskatchewan.

Clinical Sciences: Co-morbidities

Sciences cliniques : Comorbidités

CS3.01

Vitamin E as a Treatment for Fatty Liver in HIV Mono-infected Patients: the CTNPT 024 Study

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Background: Nonalcoholic steatohepatitis (NASH) is the leading cause of end-stage liver disease in Western countries. NASH is a severe condition characterized by fatty liver and inflammation, eventually leading to liver cirrhosis and early death. People living with HIV are at high risk of NASH due to excessive oxidative stress partly triggered by antiretroviral therapy. Vitamin E is an antioxidant used to treat NASH in HIV negative patients. No data as to its efficacy and safety is available in HIV mono-infected patients.

Methods: This was a phase IV, open-label, single arm clinical trial. HIV mono-infected patients with a non-invasive diagnosis of NASH were treated for 24 weeks with vitamin E 800 IU daily and then followed for additional 24 weeks after discontinuation of the intervention. NASH was diagnosed with Fibroscan with controlled attenuation parameter (CAP) ≥248 dB/m and the biomarker of hepatocyte apoptosis cytokeratin 18 (CK-18) >246 U/L. Patients with hepatitis B or C coinfection, or significant alcohol intake, were excluded. Changes in NASH were measured using CAP, CK-18 and ALT.

Results: 26 patients (median age 53, 84% males) completed the follow-up. After treatment with vitamin E for 24 weeks, parameters of NASH, including CAP and CK-18 values, improved significantly and the proportion of patients with elevated ALT was significantly lower (see Table). No serious adverse event was reported.

Conclusion: Vitamin E is an effective and well-tolerated treatment for NASH in HIV mono-infected patients. Further studies should evaluate durability of the intervention and whether longer or repeated doses are needed.

	Baseline	After 24 weeks Treatment with Vitamin E	24 weeks after Vitamin E discontinuation	p
CAP (dB/m)	314 (271-364)	277 (250-309)	324 (295-352)	0.01
CK-18 (U/L)	231 (184-356)	152 (118-210)	146 (96-343)	0.04
Patients with elevated ALT (%)	77%	17%	28%	<0.0001

Legend: Values expressed as median (interquartile range) or percentage (%). The p-values refer to t test or χ^2 test between the baseline and 24 weeks time points.

CS3.02

Cognition, from Biology to Daily Function and Quality of Life

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Background: Both cognition and quality of life (QOL) are major preoccupations of people living with HIV. The biological determinants of poor cognition and the role that cognitive difficulties play on function and quality of life in the presence of numerous other factors that may themselves affect QOL, remains poorly understood. The purpose of this study was to estimate the extent to which HIV-related variables and cognition inter-relate and influence function and QOL in HIV+ men in Canada.

Methods: The data for this study came from the inaugural assessment of the participants in the Positive Brain Health Now Cohort study. Men ≥35 years of age, HIV+ for at least 1 year, free from non-HIV-related neurological disorder and substance use disorder were comprehensively characterized. We used the Wilson- Cleary Model to link clinical variables to QOL.

Results: 708 men (mean age (SD): 53 (8.4)) were included in the analysis. Measured cognition was influenced by age and education and showed a weak link with nadir CD4 count <200 cells/μL (p-values: 0.05- 0.10). The correlations between measured cognition and mood (anxiety and depression) were low (r≈0.2). Measured cognition was impacted by a history of AIDS defining illness (p-value: 0.05- 0.10) but not by current or nadir CD4 cell count or duration of HIV infection. Measured cognition in turn was linked with the presence of self-reported cognitive difficulties, also increased in the presence of anxiety, fatigue and pain. Measured cognition had downstream effects on all aspects of function and QOL only through the presence of self-reported cognitive difficulties.

Conclusions: HIV-related variables are weakly linked to poor measured cognition. Measured cognition exerted only indirect effects on all aspects of regular daily activities

and QOL through the presence of self-reported cognitive difficulties, highlighting the central importance of patient reports.

CS3.03

A Community-Informed Pilot Trial to Determine Feasible Group Therapy for People Living with HIV-Associated Neurocognitive Disorder (HAND)

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Background: Cognitive impairment is a highly prevalent comorbidity for people aging with HIV; ~50% will be affected by HIV-Associated Neurocognitive Disorder (HAND). Modern cART and earlier treatment initiation have significantly reduced incidence of severe HAND; however, mild-to-moderate HAND persists and it can hinder the ability to cope with daily activities (e.g., employment, medication adherence). Psychosocial factors (e.g., mood, social networks) have predicted ability to cope with HAND, and focused group therapy positively effects stress, anxiety, and coping in the general population with dementia, yet the ideal HAND group intervention is unclear. To address this gap, we completed consultations and developed a pilot randomized, controlled trial.

Methods: Six HAND researchers from four countries completed key informant interviews. Two focus groups were then held – one of community leaders aging with HIV and concerned about HAND (n=10) and one of service providers working in the HIV field (n=8). These consultations were conducted to finalize trial components. These activities were guided by principles of implementation science (pilot trial's potential to scale-up can be improved by preliminary consultation) and community-based participatory research (new interventions should be co-constructed with community).

Results and Conclusion: Interviews highlighted: potential to improve uptake of brain training activities (BTA) through a group setting, need for mindfulness HAND interventions, and appropriate questionnaires. Focus groups garnered input on incorporating BTA into group therapy, the ideal mindfulness intervention, and a sensitive data collection method. People living with mild-to-moderate HAND who are aging with HIV (n=16-30), alongside other criteria, will be randomized to either Cognitive Remediation Group Therapy (*Experimental;* combination of BTA and Mindfulness-Based Stress Reduction) or Mutual Aid Support Group (*Control)*. Feasibility and acceptability are primary outcomes; intervention fidelity is secondary; and change in stress, anxiety, coping, and sustained use of intervention elements are exploratory. This presentation will discuss the trial's development process.

CS3.04

Prescription Androgen Use and Risk of Cardiovascular Disease and All-cause Mortality Among Men Living with HIV

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Background: Testosterone and other androgens are frequently prescribed for people living with HIV (PLWH) for fatigue, sexual function, vitality, body composition changes, and other conditions. The impact of androgens on liver disease, cardiovascular disease (CVD), and mortality among PLWH remains under-studied.

Methods: The Comparison of Outcomes and Service Utilization Trends (COAST) study is a retrospective cohort study of PLWH in British Columbia (BC) between 1996 and 2013. The COAST study compiles demographic and clinical data from the BC Centre for Excellence in HIV/AIDS with administrative data from Population Data BC to evaluate health outcomes among PLWH and a 10% general population comparison sample. For this analysis, eligible participants included antiretroviral therapy (ART) naïve males ages 19 years+ residing in BC. Generalized estimating equation models, assuming a Poisson distribution, provided model-adjusted rate ratios (RR) while adjusting for potential confounders.

Results: A total of 7,729 participants were included in this study, of which 1,359 (15.6%) had been prescribed androgens. Among PLWH with history of prescription androgen use, 33.9% and 14.5% had been exposed for 1-5 years or greater than 5 years, respectively. After adjustments for hepatitis C status, era of ART initiation, age at baseline, CD4 nadir and baseline viral load, the rate of all-cause mortality remained elevated among androgen-prescribed PLWH (RR=1.3, 95% CI: 1.1, 1.7). Similarly, after adjusting for confounders, the rate of CVD events (RR=1.4, 95% CI: 1.1, 1.9) was elevated among androgen-prescribed PLWH. After adjusting for hepatitis C status and other confounders, liver disease events did not occur at significantly different rates (RR=1.0, 95% CI: 0.8, 1.4).

Conclusions: After adjusting for known confounders, all-cause mortality and cardiovascular events occurred at higher rates among PLWH prescribed androgens compared to those who were not. Future pharmacokinetic studies are needed to further assess the long-term effects and safety of prescription androgen use.

CS3.05

The Prognostic Role of the CD4/CD8, Neutrophil/Lymphocyte and Platelet/Lymphocyte Ratios in Cardiovascular Disease Risk among People Living with HIV

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Background: Chronic inflammation increases the risk of non-AIDS comorbidities, including cardiovascular disease (CVD) among people living with HIV (PLWH). We evaluated the prognostic role of the CD4/CD8 ratio, neutrophil/lymphocyte ratio (NLR) and platelet/lymphocyte ratio (PLR) in CVD incidence among PLWH.

Methods: This retrospective cohort study was conducted using data from the STOP HIV/AIDS population-based cohort. Individuals were antiretroviral therapy-naïve, were ≥18 years old, who initiated treatment between 1 January 2000 and 31 March 2014, had ≥12 months of follow-up and were without CVD (i.e., acute myocardial infarction, congestive heart failure, ischemic heart disease, cardiovascular accident, transient ischemic attack, and cerebrovascular syndrome). The outcome was incident CVD, measured during follow-up (i.e., until 31 March 2015, last contact date or date of death). Separate path analysis models were constructed for each log-scaled biomarker, using Mplus 8.0.

Results: Among 2038 individuals, 132 incident CVD diagnoses were identified (9.51/1000 person-years (95% Confidence Interval (CI): 7.95-11.35)). A direct negative effect of the CD4/CD8 ratio on incident CVD was verified (Odds Ratio (OR): 0.65 95% CI 0.49-0.87). A positive direct effect of the NLR on developing CVD was also established (OR: 1.57 95% CI 1.13-2.19). However, the direct effect of PLR was non-significant. Several covariates had significantly impacted CVD incidence indirectly (mediation), via these biomarkers. For example, CD4 nadir (per 100 increment) and sex (male vs female) had a significant negative and positive indirect effect, respectively, on incident CVD via CD4/CD8 ratio mediation (OR: 0.93 95% CI 0.89-0.98 and OR: 1.04 95% CI 1.01-1.08, correspondingly).

Conclusion: The CD4/CD8 ratio and NLR had direct and significant effects on CVD incidence, while PLR did not. Several covariates had significant mediated effects on the outcome, via these biomarkers. Further research is needed to assess whether the CD4/CD8 ratio and NLR should be used to monitor CVD risk among PLWH.

CS3.06

Prevalence and Predictors of Airflow Obstruction in an HIV Tertiary Care Clinic in Montreal, Canada

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Background: The reported prevalence of Chronic Obstructive Pulmonary Disease(COPD) in people living with HIV(PLWH) varies widely(7-60%) depending on the population and methods used, underscoring the uncertainty of the estimates. Our objective was to estimate the prevalence of COPD in unselected PLWH and identify characteristics that increase the risk of non-reversible airflow obstruction in order to guide screening strategies for COPD.

Methods: All persons ≥18 years of age attending the Chronic Viral Illness Service(population≈2000 PLWH) were invited to participate, regardless of smoking status or history of known COPD/asthma. Individuals underwent standard spirometric testing both pre and post salbutamol bronchodilator and completed the MRC dyspnea scale, which rates the severity of dyspnea on a scale of 1-5. Multivariate logistic regression was used to evaluate risk factors associated with COPD, reported as adjusted odds ratios(aOR).

Results: Of 492 participants, 54(11%) had COPD on spirometry. Median age(Q1;Q3) was 51(43;58), 28% were female, median duration of HIV was 15 years(9; 22) and 95% were on antiretrovirals. Median CD4 count was 600(440;784) and nadir CD4 count was 227(121;357). Median MRC dyspnea score was 1(1;2), implying a low burden of dyspnea. A high proportion of patients with airflow obstruction met at least 1 criteria for reversibility(57%). The following risk factors for COPD were assessed: smoking history(aOR: 2.4, 95% CI:[1.26; 4.78]), age (1.77 [1.34; 2.39]), female sex (1.21 [0.55; 2.53]), and higher nadir CD4 count (0.88 [0.74; 1.04] per 100 cells).

Conclusion: Both smoking status and older age independently predicted the presence of airflow obstruction in PLWH. Low nadir CD4 appeared to be associated with the presence of COPD. These findings suggest that PLWH who are ≥50 years, smokers and those with nadir CD4 counts ≤200 cells/μL should undergo spirometry screening for COPD. The high rate of reversible airflow obstruction is a novel finding and merits further exploration.

CS3.07

Impact of Aging and Duration of Combination Antiretroviral Therapy (cART) on Quality of Life (QofL) in Persons Living with HIV (PLWH)

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Introduction: HIV is now a chronic disease with many living to older age. It is unknown whether older persons living with HIV (PLWH) who had longer exposure to cART (combination antiretroviral therapy) have different health outcomes than those with lesser cART exposure.

Objectives: To compare demographics, habits and QofL measures in an aging HIV cohort categorized by cART duration.

Methods: Data from OHTN Cohort Study (OCS) survey for PLWH ≥ 50 years of age who completed the Extended Questionnaire in 2014-2015 were studied. Chi-square tests for trend and Kruskal-Wallis tests were used to compare outcomes of the EQ-5D QofL questionnaire by three categories of cART duration: ≤ 10 years, 10-20 years, ≥ 20 years.

Results: 652 PLWH (180, 312, 160 in low to high duration categories respectively) were included, 17% females. The longest cART duration group were slightly older: median age 58 versus 56 in the other groups (p=0.001). The longer the cART duration, the higher % Caucasians (55%, 60%, 80%, p<0.0001) and MSM (54%, 64%, 76%, p<0.0001); lower IDU (6%, 4.5%, 1.25%, p=0.03) and HIV endemic (16%, 15%, 4%, p<0.0001) risk factors. Participants in the three groups were not different with respect to education level (p=0.50) and gross personal income (p=0.5). Most had VL≤50 (93%, 94%, 95%, p=0.68). Lifestyle habits such as frequent alcohol intake (p=0.34), current smoking (p=0.61) and cannabis use (p=0.35) were also similar between the groups. Overall health state (VAR scale) was 75 for participants in each of the three groups (p=0.40). The outcomes of the five domains of the EQ-5D (mobility, self-care, usual activities, pain, anxiety) were similar in the three groups with > 50% reporting no problems and < 10% reporting significant problems in any domain.

Conclusion: PLWH ≥50 years of age reported good to excellent QofL which did not differ by cART duration.

CS3.08

Cancer Among People on HIV Antiretroviral Therapy, British Columbia, 2000-2012: Comparison of Outcomes and Service Utilization Trends (COAST) Cohort Study

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Background: We quantified cancer incidence and prevalence among people on modern cART in BC.

Method: The COAST study is a population-based cohort of people living with HIV (PLWH) aged 19+ and a 10% random sample of the BC population. We included PLWH who initiated cART from 2000-2012. Primary cancer diagnoses were ascertained using the BC Cancer Agency registry and classified as: *AIDS-* versus *non-AIDS-defining malignancies* (ADMs versus NADMs); and *infection-related* versus *infection-unrelated malignancies* (IRMs versus IUMs). We estimated lifetime cancer prevalence at cART initiation; incidence of a primary cancer diagnosis at follow-up; and 5-year prevalence among survivors on 31/12/2012, and report age-adjusted estimates with 95% confidence intervals (CI) using the 2011 Canadian population as the standard.

Table. Age-adjusted incidence per 1000 person-years (CI) of primary cancers among PLWH

	2000-03	2000-03	2004-07	2004-07	2008-12	2008-12
	Incidence	Ratio cf HIV-	Incidence	Ratio cf HIV-	Incidence	Ratio cf HIV-
All cancers	17.75 (8.07, 27.42)	3.00 (1.37, 4.64)	17.93 (12.52, 23.35)	3.23 (2.25, 4.20)	8.45 (6.52, 10.38)	1.46 (1.13, 1.79)
ADMs	13.04 (5.57, 20.51)	37.36 (15.96, 58.75)	7.66 (4.56, 10.76)	19.96 (11.87, 28.04)	2.63 (1.65, 3.62)	7.09 (4.43, 9.75)
NADMs	4.71 (0.00, 10.93)	0.85 (0.00, 1.97)	10.27 (5.79, 14.76)	1.99 (1.12, 2.85)	5.81 (4.15, 7.47)	1.07 (0.77, 1.38)
IRMs	14.13 (6.51, 21.76)	23.74 (10.93, 36.55)	11.12 (7.18, 15.07)	17.87 (11.54, 24.21)	4.04 (2.83, 5.25)	6.41 (4.49, 8.33)
IUMs	3.62 (0.00, 9.64)	0.68 (0.00, 1.81)	6.81 (3.03, 10.58)	1.38 (0.61, 2.15)	4.40 (2.90, 5.91)	0.85 (0.56, 1.15)

Results: A total of 4,455 PLWH (20% female) and 483,780 HIV- individuals were followed for 22,157 PY and 4,482,897 PY, respectively. Lifetime cancer prevalence at cART initiation was 4.66% (3.55, 5.77). At follow-up, 218 new cancers were diagnosed among 200 PLWH; most common were non-Hodgkins lymphoma (n=61); Kaposi sarcoma (n=44); lung (n=23); anal (n=16); and liver cancer (n=10). Nearly

3/4 (72%) were diagnosed >6 months after cART initiation. Compared to HIV-, higher cancer incidence was observed for ADMs and IRMs (Table). By 2012, 5-year cancer prevalence was 2.68% (2.03, 3.32) among PLWH.

Conclusion: Incidence of ADMs and IRMs among PLWH on cART declined over time, but remained higher than in the HIV- population. Most were diagnosed >6 months *after* cART initiation, suggesting challenges in maintaining viral suppression or cumulative effects of incomplete immune restoration.

Epidemiology and Public Health: PrEP for HIV

Épidémiologie et santé publique : PrEP pour le VIH

EPH3.01

PrEP Initiation Following PEP: Creating a Corridor of Care at l'Actuel

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Background: Since 2013, Pre-Exposure Prophylaxis (PrEP) counseling has been offered during Post-Exposure Prophylaxis (PEP) consultations at l'Actuel, a sexual health clinic in Montreal. We aim to assess the proportion of men who have sex with men (MSM) patients initiating PrEP following PEP and factors associated with this decision.

Methods: Using PEP and PrEP databases, we retrospectively calculated the proportion of MSM beginning PrEP following PEP treatment from January 2013 to November 2017. We compared demographic and risk profiles between groups of individuals electing to initiate PrEP or not, using chi-square and t-tests. Multivariate logistic regression estimated adjusted Odds Ratios (aORs) for factors associated with PrEP initiation, including age, education, number of PEP episodes, antecedent STI (yes/no), and chemsex (yes/no).

Results: 1939 MSM consulted for PEP, and 513 (26.5%) subsequently initiated PrEP during the analysis period. Among those who initiated PrEP, 25% had experienced ≥3 PEP episodes and 32% initiated PrEP within one week of PEP completion. Probability of PrEP initiation was only associated with PEP frequency (2 episodes relative to 1, aOR=1.83 (95%CI: 1.42-2.37); ≥ 3 episodes relative to 1, aOR=2.35 (95%CI: 1.75-3.15)), chemsex use (aOR=1.56, 95%CI: 1.19-2.04) and antecedent STI (aOR=1.29, 95%CI: 1.12-1.72). No effect was observed for age or education.

Table 1: Comparison of demographic and risk profiles among PEP patients electing to initiate PrEP or not

		PEP only	Initiated PrEP after PEP	Total PEP patients	P-value
Age (mean, sd)		34.8 (11.1)	35.3 (9.6)	34.9 (10.7)	0.30
Education, N (%)	**Secondary**	203/1302 (15.6%)	62 /473 (13.1%)	265/1775 (14.9%)	0.11
	College	305/1302 (23.4%)	97/473 (20.5%)	402/1775 (22.6%)	
	University	794 /1302 (61%)	314/473 (66.4%)	1108/1775 (62.4%)	
Total # of PEP episodes, N (%)	**1 episode**	1,045 (73.3%)	289 (56.3%)	1,334 (68.8%)	<0.01
	2 episodes	240 (16.8%)	126 (24.6%)	366 (18.9%)	
	≥ 3 episodes	141 (9.9%)	98 (19.1%)	239 (12.3%)	
Chemsex, N (%)		192 (13.5%)	105 (20.5%)	297 (15.3%)	<0.01
Self-reported antecedent infection with any STI, N (%)		788 (55.3%)	337 (65.7%)	1125 (58%)	<0.01
Self-reported antecedent Gonorrhea, N (%)		335 (23.5%)	183 (35.7%)	518 (26.7%)	<0.01
Self-reported antecedent Chlamydia, N (%)		296 (20.8%)	157 (30.6%)	453 (23.4%)	<0.01
Self-reported antecedent Syphilis, N (%)		117 (8.2%)	80 (15.6%)	197 (10.2%)	<0.01
TOTAL		**1426 (73.5%)**	**513 (26.5%)**	**1939 (26.5%)**	

Conclusion: We found PrEP initiation among PEP users was associated with greater risk behaviours, including multiple PEP episodes, chemsex practices, and antecedent STIs. This indicates that individuals with ongoing risks of HIV infection are receptive to PrEP referrals which may lead to reductions in the need for PEP.

EPH3.02

PrEP Use and Changes in Sexual Behaviour: Results from the Ontario-Wide #iCruise Study

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Background: Gay, bisexual and other men who have sex with men (GBM) are increasingly using pre-exposure prophylaxis (PrEP). More information is required regarding who is using PrEP and its effects on sexual behaviour.

Methods: The #iCruise study is a mixed-methods Ontario-wide study of GBM aged >13. Participants were recruited via websites, mobile-apps and ASOs. Baseline questionnaire data from participants was collected between July-October, 2017. Eligibility for analysis included being HIV-negative on PrEP, HIV-negative not on PrEP/unsure or HIV status unknown. Familiarity with PrEP was assessed.

Participants on PrEP reported adherence rates and sexual behaviour changes since starting PrEP. T-tests, Fisher's exact tests and multivariable logistic regression (MLR) modeled socio-sexual demographic factors associated with currently taking PrEP (Yes/No).

Results: Among 569 participants, 55 reported currently being on PrEP; (12.97% of HIV-negative guys). Nearly all (92.4%) had heard of PrEP: 13.1% heard of PrEP but didn't know more; 52.8% were familiar with PrEP and 27.4% reported knowing a lot about PrEP. Nearly a third (30.4%) believed they have coverage for PrEP and 31.9% didn't know. Sexual behaviour changes after PrEP initiation: 40.9% reported more sexual partners, 9.1% reported more condom use, 75.0% reported more condomless anal sex and 43.2% reported asking about partner's HIV status more often. In a one-week period, 76.7% (n=33) reported zero missed doses of PrEP, 11.6% (n=5) missed 1 dose, 9.3% (n=4) missed 2 doses and 2.3% (n=1) were unsure. GBM on PrEP vs. not on PrEP were significantly older (mean age 34 vs. 30 years; ttest:p=0.0279) and more likely to have a greater income (Fisher's exact:p=0.040). However, no socio-sexual demographic variables were significantly associated with being on PrEP in the MLR model (all p>0.05).

Conclusion: Awareness and knowledge of PrEP was high among Ontario GBM. Some significant changes in sexual behaviour were reported after initiating PrEP.

EPH3.03

Estimating Targets for PrEP Referrals and Retention Among Canadian MSM to Achieve Population Health Goals in an Implementation Science Project

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Background: Canadian MSM with sexually transmitted infections (STIs) including early syphilis, rectal gonorrhea and rectal chlamydia, and HIRI-MSM risk index scores ≥25, experience HIV incidences of 1.59-7.10 and 7.40/100 person-years respectively. We estimated the minimum PrEP referral targets for MSM who meet these two criteria (STIs, HIRI-MSM ≥25) to achieve two population-level HIV prevention goals.

Methods: We synthesized 1300 published simulations of PrEP implementation scenarios among high-risk MSM from six high-income settings to identify the minimum PrEP uptake where cost-effectiveness ratios remained below willingness-to-pay thresholds of $50,000-100,000 USD/quality-adjusted life-year (goal 1, cost-optimization). We next used Ontario data to simulate a cohort of MSM meeting each criterion, assuming 10 years of high risk and 3 years of PrEP use per person, and 86% PrEP effectiveness, and determined the minimum level of PrEP uptake that would reduce HIV incidence over 10 years by 50% (goal 2, halving HIV incidence). Finally, we combined estimates of attrition along the PrEP cascade from clinics in Toronto and Hamilton, to estimate the proportion of referrals needed to achieve the PrEP uptake targets.

Results: Goal 1 could be achieved with 25-50% PrEP uptake among MSM meeting the STI criterion, and 50% for the HIRI-MSM criterion. To achieve goal 2, PrEP uptake targets are 40-42% and 41%, respectively**.** Clinic data showed that 171/249=69% of patients referred for PrEP attend their first visit, of which 136/171=80% start PrEP, and of which 118/136=87% are retained at 6 months. Thus, to achieve 41% PrEP uptake (average target for goals 1 and 2), ~85% of MSM who meet the STI and HIRI-MSM criteria would need to be referred.

Conclusions: A substantial decrease in HIV incidence could be achievable and cost-effective if ~85% of MSM with early syphilis, rectal gonorrhea/chlamydia, and HIRI-MSM scores ≥25 are referred for PrEP.

EPH3.04

Decreases in HIV Incidence in a Montreal Clinic Coincide with Expanding PrEP Use

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Background: With the elimination of HIV transmission by 2030 as a goal of Montreal's Fast-Track City Initiative, combined prevention strategies (CPS) are key to eliminating HIV. There is little evidence to link decreases in HIV incidence with increased rates of individuals initiating PrEP or changes in other CPS.

Methods: To examine the effects of CPS on rates of HIV transmission, we look at annual HIV incidence, number of PrEP and PEP consults, individuals screened, mean of HIV tests per individual, and proportion of undetectable seropositive patients annually from 2011–2016 at l'Actuel, a sexual health clinic in Montreal.

Results: From 2011-2016, HIV incidence dropped by 56%, from 2.31 to 1.03 diagnoses per 100 individuals screened annually (Table 1). Meanwhile, consultations for PrEP increased exponentially. Gradual increases were observed in PEP treatments and proportion of undetectable seropositive patients, which reached 95% by 2016. The number of individuals screened annually and the number of tests per person increased from 2011-2016, by 47% and 31%, respectively.

Discussion: This data shows a major drop in recent HIV incidence at one major clinic in Montreal. This decline, in parallel with the exponential increase in PrEP initiations, confirms the importance of ensuring PrEP is available to everyone who should need it. It is important to underline, however, this decline was already in progress and likely

attributable in part to progress towards treatment as prevention and other preventive efforts. Continued efforts to monitor the potential influence of CPS on new HIV cases at a population level are essential.

Table 1. Trends in HIV diagnosis and combined prevention measures at Clinique l'Actuel 2011-2016

Year	HIV diagnoses (N= 703)	People tested (N= 21,950)	New HIV infections per 100 people tested	Average # tests per person per year	Annual percent change in HIV rates	PrEP consults (N= 1,318)	PEP consults (N= 3,214)	% of HIV patients with undetectable viral load
2011	126	5453	2.31	1.21		3	380	92
2012	120	5942	2.02	1.32	-12.60%	5	444	91
2013	145	5925	2.45	1.33	+21.18%	27	472	93
2014	118	6369	1.85	1.36	-24.29%	94	514	94
2015	112	6988	1.60	1.52	-13.49%	460	665	94
2016	82	7991	1.03	1.59	-35.98%	729	739	95

EPH3.05

PrEP-ing for the Future: Pre-exposure Prophylaxis Consultation, Acceptance, and Anticipated Need Among MSM Attending a New Sexual Health Clinic in Vancouver, BC

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Introduction: Men who have sex with men (MSM) continue to be at increased risk for HIV infection and remain disproportionately represented among those newly diagnosed. Randomized clinical trials support use of PrEP as an effective mechanism for preventing new HIV infections. Here we evaluate current PrEP consultation practice and quantify potential future patient volume for PrEP in a new men's sexual health clinic.

Methods: Electronic records for clinic visits between April 1 and September 30, 2017 were extracted. Clinic records were probabilistically linked to provincial records for recent STI's diagnosed between October 1, 2016 and September 30, 2017. Among all clinic attendees recent STI diagnoses (syphilis, rectal chlamydia or rectal gonorrhea) were used as an indicator of risk of HIV acquisition. Among those with a physician PreP consultation, additional indicators were available (HIRI score and lifestyle factors). Univariate analyses were used to compare PrEP consultation, initiation and continuation.

Results: Among 2,735 unique HIV negative individuals who visited the clinic, 6% (n=163) received a PrEP consultation. From there, 90% (n=147) received a PrEP prescription and 70% (n=82) of those eligible, returned for a second prescription. A higher proportion of those who received a consultation were diagnosed with a recent rectal STI (p-value = <0.01) compared to those without STI, but not for syphilis (p-value = 0.67). HIRI scores and lifestyle factors did not differ between those initiating and declining PrEP or those continuing and discontinuing PrEP. A large proportion of at risk patients (85% of rectal STI and 92% of syphilis diagnoses) did not receive a physician consult.

Discussion: STI history indicates that additional MSM could benefit from PrEP, but have yet to receive a physician consultation at this clinic. Standardized assessments for PrEP may improve clinical practice and support expanded uptake when medication access is no longer a barrier.

EPH3.06

Combination HIV Prevention Among Montreal Gay, Bisexual, and Other Men Who Have Sex with Men in the PrEP Era: a Latent Class Analysis

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Background: Preliminary survey data from Montreal suggest rapid uptake of pre-exposure prophylaxis (PrEP) among gay, bisexual, and other men who have sex with men (gbMSM). This could have important implications for HIV prevention. We examine latent patterns of uptake of risk reduction strategies through combination HIV prevention among Montreal gbMSM.

Methods: Engage, a cross-sectional study in three cities, recruited cisgender and transgender men ≥16 years who had sex with another man in the past 6 months using respondent-driven sampling. Latent class analyses (LCA) empirically categorized the first 514 Montreal participants into similar classes based on self-reported use of combina-

tion HIV prevention. LCAs were stratified by HIV serostatus; both models included indicators for condom, strategic positioning, and serosorting methods (last 6 months). The HIV-negative/unknown model included HIV testing, post-exposure prophylaxis (PEP), and PrEP, whereas viral suppression was added to the HIV-positive model.

Results: Among HIV-negative/unknown participants (n=389), a 4-class model was selected. Class 1 is composed of those serosorting (20%); class 2, those using PEP and/or PrEP (14%); class 3, consistent condom users (30%); and class 4, those with low reported uptake of prevention (36%), possibly because these men report small numbers of anal sex partners. Among HIV-positive participants (n=125), a 3-class model was selected; most men in all classes were virally suppressed (86-100%). Class 1 consisted of those using condoms and strategic positioning (11%); class 2, those serosorting (41%), and class 3, those with low reported uptake of prevention methods (48%). These results will be updated once recruitment is completed.

Conclusions: Montreal gbMSM vary significantly in their preferred risk reduction strategies. Moreover, these results provide a sense of the present level of integration of antiretroviral-based methods in their risk reduction strategies. Future work will identify the determinants of latent class membership.

EPH3.07

Modeling Pre-Exposure Prophylaxis (PrEP) and the Influence of Sexual Mixing Patterns on HIV Epidemics among Men who have Sex with Men (MSM)

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Introduction: Seroadaptive sex/serosorting refers to modifying partner selection, with differential condom use and sexual positioning, based on the perceived HIV serostatus of each partner. PrEP reduces HIV susceptibility, and data suggest declines in preferential mixing by MSM after starting PrEP. We sought to determine how baseline and PrEP-mediated changes in seroadaptive sex may influence the population impact of PrEP on HIV incidence.

Methods: We developed a mathematical model of HIV transmission in MSM stratified by sexual activity and perceived HIV serostatus, parameterized with bio-behavioural data from MSM across Canada (2005-2007, 2012-2014), and fit at equilibrium to: 17% HIV prevalence, 86% HIV treatment coverage, and annual HIV diagnoses of 946 per 100,000 MSM. We fit across a plausible range from moderately seroconcordant mixing to proportionate (no preference) using empirical estimates. We assumed stable 50% PrEP coverage by year 1 and compared HIV incidence 10 years post-intervention.

Results: PrEP had a larger population-impact under seroconcordant (vs. proportionate) mixing. As mixing patterns shifted from moderately seroconcordant to proportionate, the impact of PrEP was reduced compared to scenarios with no change in seroadaptive mixing; the magnitude of this reduction varied by PrEP effectiveness (Table 1).

Table 1. Effect on HIV incidence of PrEP-mediated changes in sexual mixing under varying levels of PrEP adherence, from 100 model fits*

	Median (Inter-quartile range) HIV incidence after PrEP, per 100 Canadian MSM per year						
	No PrEP	PrEP effectiveness 44%		PrEP effectiveness 86%		PrEP effectiveness 99%	
Years after PrEP		No change in sexual mixing	Change from seroconcordant to proportionate mixing by MSM on PrEP**	No change in sexual mixing	Change from seroconcordant to proportionate mixing by MSM on PrEP**	No change in sexual mixing	Change from seroconcordant to proportionate mixing by MSM on PrEP**
1	1.78 (1.76-1.80)	0.74 (0.70-0.77)	0.92 (0.85-0.99)	0.54 (0.49-0.56)	0.65 (0.59-0.71)	0.47 (0.43-0.50)	0.56 (0.52-0.63)
5	1.78 (1.76-1.80)	0.40 0.35-0.42)	0.67 (0.59-0.79)	0.28 (0.25-0.30)	0.45 (0.40-0.53)	0.25 (0.21-0.27)	0.39 (0.35-0.45)
10	1.78 (1.76-1.80)	0.23 (0.19-0.26)	0.50 (0.43-0.64)	0.16 (0.13-0.18)	0.32 (0.27-0.40)	0.14 (0.12-0.16)	0.26 (0.23-0.33)

*100 best fits using maximum likelihood methods. Fit to

- 17% HIV prevalence [based on weighted average of data from Toronto, Montreal, Ottawa, Winnipeg and Victoria (2005-2007) and Vancouver (2008-2009)]
- 86% HIV treatment coverage [based on reports from Ontario (2013-2015) and BC (2013-2016)]
- Annual HIV diagnoses of 946 per 100,000 MSM [data from Vancouver and Toronto (2005-2016)]

** Seroconcordant mixing: individuals select partners with perceived HIV serostatus similar to themselves; proportionate mixing: individuals select partners "randomly", ie. no preference with regard to partner's HIV serostatus

Discussion: Current models that assume proportionate mixing by HIV serostatus may underestimate the potential impact of PrEP, while changing partnership preferences by PrEP users could reduce PrEP impact if adherence is low. It is important to empirically measure sexual mixing patterns (describing respondent and sex partner with attributes eg. HIV status) in the design and evaluation of PrEP implementation.

EPH3.08

Longitudinal Event-Level Analysis of Anal Sex Versatility among Gay and Bisexual Men in the Momentum Health Study

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Background: Epidemiological models identify anal sex versatility as an important HIV transmission factor among gay and bisexual men (GBM). However, there are few analyses of GBM event-level versatility, i.e. having both receptive and insertive anal sex in the same sexual encounter. This exploratory study examined longitudinal data from the Momentum Health Study to identify associations between event-level versatility and socio-economic, psycho-social, partnership, and substance use variables.

Methods: Event-level data consisting of sexual behavior and substance use reported for study participants' last five sexual partners were collected from six-month repeated study visits from February 2012-December 2016. We used multivariate generalized linear mixed models to identify factors associated with versatility and multivariate log-linear tests to assess substance use interactions.

Results: Study data included 644 GBM (Med. visits =6, Q1-Q3=2-7) who reported 7,036 anal sex events of which 1,279 were versatile, 2,773 insertive and 2,984 receptive. In the multivariable mixed model versatility was significantly ($p<0.05$) associated with younger age (aOR=0.98, 95%CI=0.97-0.99), not being married or in a common law relationship, (aOR=1.33, 95%CI =1.01-1.75), and using marijuana (aOR=1.52, 95%CI=1.23-1.87), erectile dysfunction drugs (EDD) (aOR=1.99, 95%CI=1.51-2.61), and GHB (aOR=1.49, 95%CI=1.09-2.03) in the past six months. Multivariable log-linear modeling showed significant interactions between marijuana and EDD (aOR=2.35, 95%CI=2.05-2.71), marijuana and GHB (aOR=1.51, 95%CI=1.22-1.88), and EDD and GHB (aOR=7.63, 95%CI=6.15-9.46), but not for all three substances (marijuana*EDD*GHB). HIV status was not a significant factor.

Discussion: Event-level versatility was significantly associated with age, partnership status, and substance use. Statistically significant substances did not include crystal methamphetamine or poppers, sex drugs historically associated with GBM anal sex patterns. Instead, our analysis revealed new substance use combinations featuring marijuana and GHB. We need qualitative research to understand the motivations for using these substances in GBM's versatile anal sex events.

Social Sciences: Risks, Prevention, and Resilience

Sciences sociales : Risques, prévention et résilience

SS3.01

A Tale of Two Epidemics: Gay and Bisexual Men's Mental Health Service Needs and Experiences in a Period of Effective Biomedical HIV Prevention and Treatment Options

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Background and Objective: Gay and bisexual men experience higher rates of anxiety, depression, suicidal ideation and substance dependence due to minority stress and syndemic risk factors like HIV. Despite this, they do not always connect to available services and support. We aim to contribute to the limited Canadian qualitative research on gay men's mental health service needs and experiences.

Methods: We performed in-depth qualitative interviews with 22 gay and bisexual men living in Toronto, some of whom were living with HIV, who self-identified as having experienced mental health challenges and/or having accessed mental health services. We recruited participants from a nation-wide biomedical and socio-behavioural study utilizing respondent-driven sampling. Interviews were analyzed in NVivo using Grounded Theory.

Results: Three features organized the relationship between HIV and mental health. (*1) Improvements to mental heath related to treatment and prevention advances*: HIV-positive participants spoke about confidently managing their HIV and achieving undetectability. Many HIV-negative participants relied on PrEP and undetectability to manage risk, anxiety and depression. Nonetheless, participants continued to experience mental distress related to HIV, stigma and intimate relationships. *(2) Barriers to mental health services*: Participants discussed prohibitive costs, limited awareness of services, negative/traumatic experiences with providers, a perceived lack of crisis/urgency and mental exhaustion as barriers. (3) *HIV as a pathway to mental health services:* HIV-positive participants discussed being linked to mental health services by their HIV specialists and through ASOs. PrEP-users relied on their prescribing physicians as a way to access support and services.

Conclusion: HIV treatment and PrEP are having positive effects on the mental health of gay men. However, HIV contributes to mental health burdens that are difficult to manage given current barriers. More gay-focused mental health services and education are needed. ASOs and physicians must link gay men to appropriate mental health services before they reach crisis.

SS3.02

A Latent Class Analysis of Substance Use and Culture among Gay, Bisexual, and Other Men Who Have Sex with Men

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Background: This paper sought to identify diverse patterns of concurrent substance use among HIV-positive and HIV-negative gay and bisexual men (GBM) with the aim of understanding how substance use patterns shape HIV risk.

Methods: Latent class analysis (LCA) was used to identify clustering in reported substance use. Participants were sexually-active GBM, aged ≥16 years, living in Metro Vancouver (n=774). LCA indicators included all substances self-reported by more than 30 men over the past six months. Model selection was made with consideration to parsimony, interpretability, and optimization of statistical criteria. Multinomial regression identified socioeconomic and identity-related factors associated with class membership.

Results: A six-class solution identified 'poly-drug use' (i.e., assorted use of a broad variety of drugs; 4.5% of sample), 'club drug use' (i.e., elevated use of alcohol, marijuana, cocaine, mushrooms, ecstasy, and LSD; 9.5%), 'street drug use' (i.e., elevated use of heroin and other opioids along with less frequent use of more expensive drugs; 12.1%), 'sex drug use' (i.e., elevated use of GHB, crystal meth, poppers, and erectile dysfunction drugs; 11.4%), 'conventional drug use' (i.e., tobacco, alcohol, marijuana; 25.9%), and 'limited drug use' (i.e., low use of all drugs except alcohol; 36.7%). With limited drug use as the referent class, key demographic, social, and economic factors predicted class membership: Notably, Socioeconomic and identity-related factors (e.g., sexual orientation, community participation) shaped substance use patterns. Of epidemiological importance, HIV-positive men (aOR=0.97,95%CI=2.18-16.34) were more likely to report polydrug use (aOR=5.97,95%CI=2.18-16.34) and sex drug use (aOR=3.98,95%CI=2.07-7.65). Injection drug use was more prevalent among polydrug users (47.1%), sex drug users (26.1%), and street drug users (23.5%).

Conclusion: GBM exhibit diverse patterns of substance-use that reflect differences in minority coping, social integration, and risk-behaviour. Our results highlight the need for programs and policies that seek to lessen social disparities and account for social distinctions among GBM.

SS3.03

Experience of Intimate Partner Violence Increases Exposure to HIV in Gay, Bisexual and Other Men Who Have Sex with Men

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Background: There are scarce data on the role that interpersonal trauma plays in HIV risk management strategies (HIV-RMS) adoption in gay, bisexual, and other men who have sex with men (GBMSM). We investigated the association of intimate partner violence (IPV) experience with HIV-RMS among GBMSM.

Methods: A community sample of 1,028 GBMSM, aged 18 to 75 years (M = 39.4, SD = 13.1) and mainly from Montreal (72%), completed an online questionnaire between May 2016 and January 2017. Only GBMSM who reported having been in a relationship in the past 12 months (54.1%; n=556) were included. HIV-RMS, including strategies such as condoms, PEP, PrEP and viral load monitoring, were assessed for the last five sexual encounters. IPV was assessed using the six-item IPV screening tool for GBM (Stephenson et al. 2013) covering six domains: physical, sexual, HIV-related and emotional violence, as well as monitoring & controlling behaviours, and threats.

Results: About a quarter (24.5%) of the sample reported inefficient HIV-RMS during their last five sexual encounters, leading to potential HIV exposure. Prevalence rates for the six forms of IPV ranged from 6 to 11%, with 25.5% reporting at least one form. Controlling for sociodemographics, problematic substance use and psychological distress, reporting at least one form of IPV during the past year was associated with a significantly greater likelihood of using inefficient HIV-RMS during their last five sexual encounters (OR = 1.71; 95%CI = 1.02-2.88). No single form of IPV was significantly associated with HIV-RMS.

Conclusion: Preventing interpersonal trauma and its impacts can contribute to more efficient choices in HIV prevention among GBMSM. Future research should explore victimization-related mechanisms, such as post-traumatic stress symptoms, to better understand how IPV translates into specific HIV-RMS. The results also highlight the predictive validity of a composite yet short form of IPV screening tool.

SS3.04

Latent Profile of Adverse Childhood Experiences among Gay, Bisexual and Other Men Who Have Sex with Men: Examining the Buffering Effect of Social Support

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Background: Adverse childhood experiences (e.g., physical abuse, or emotional neglect or sexual abuse) among gay, bisexual and other men who have sex with men (GBM) may not be isolated incidents, but may be connected and occur in clusters. This study examines how different forms of childhood neglect and abuse may cluster together, rather than treating them as additive or hierarchical.

Methods: Using Latent Profile Analysis (LPA), we examined abuse experiences among 470 Toronto GBM with standardized scores on Childhood Trauma Questionnaire Short Form subscales. We fit personal, psycho-social, and behavioral main effects models and interaction models examining buffering effects from social support.

Results: Experiences of abuse (sexual, physical and emotional) and neglect (physical and emotional) were prevalent (38%-92%), and some study participants experienced these abuses simultaneously (r=.33-.65, p< .001). LPA fit indices suggested three profiles: *Minimal*, *Emotional*, and *Poly Victimized* GBM. Regression analyses suggest a main effect model: higher depression, anxiety, and serodiscordant condomless anal sex, and lower family support among *Poly Victimized* GBM compared to *Minimally Victimized* GBM. *Emotionally Victimized* GBM also reported lower social support compared to *Minimally Victimized* GBM, and lower depression and anxiety compared to *Poly Victimized* GBM. However, results did not support a buffering effect from social support (Interaction terms were non-significant).

Table 1: Estimated standardized mean score of physical, emotional and sexual victimization by class membership, Gay Strength Study (N=470)

Standardized Score	Minimal Victimization Profile	Emotional Victimization Profile	Poly- Victimization Profile
CTQ-PA	-0.436	0.446	2.824
CTQ-PN	-0.432	0.703	1.655
CTQ-EA	-0.514	0.869	1.833
CTQ-EN	-0.498	0.973	1.2
CTQ-SA	-0.297	0.336	1.857

Conclusion: LPA allowed us to overcome the shortcomings of using sum, cut-off, or binary (abuse/no abuse) score approaches, and to identify GBM who experienced multiple and more frequent forms of abuse. Results could inform profile-specific interventions for GBM with histories of childhood trauma.

SS3.05

Sexual Encounters Among Afro-Caribbean Immigrants Post Arrival in Canada: a Reconstructed Vulnerability to HIV?

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Background: The MSAFIRI Study found that over a third of infections among African, Caribbean and Black (ACB) immigrants are acquired post-arrival in Ontario, Canada.

Objective: We explore the social contexts of sexual HIV acquisition among ACB immigrants post-arrival and in Canada.

Methods: In-depth interviews were conducted with a heterogeneous sample of 44 MSAFIRI Study participants from 5 clinics in Ontario to explore circumstances under which they became sexually infected with HIV. Data were analyzed using constructivist grounded theory.

Results: Participants included 19 straight and 1 bisexual women, 6 straight and 17 gay men. Their median age was 41; 18 were of African and 26 of Caribbean origin. About one third each were: born in Canada, immigrated pre-puberty, immigrated post-puberty. Interviews highlighted pathways by which their HIV risks were reshaped and constructed in Canada, as interpreted through cross-cutting themes of 1) identity and cultural loss, reflecting racialized social struggles borne by those who immigrated during adolescence and adulthood, 2) "Canadian" immunity, reflecting an erosion of HIV risk perception upon settlement, and entry into biracial relationships (by men particularly); and 3) the hegemony of sponsorship, reflecting persisting gender-based power differentials in relationships that were built upon migrant sponsorship.

Conclusion: Afro-Caribbean immigrants' vulnerability to HIV appear to be reconstructed post-arrival in Canada, shaped by migrant identities that reveal novel racialized and gendered dimensions of HIV risk. Prevention strategies could address these dimensions to break the cycles of risk among persons moving from countries of higher to lower HIV burden.

THEMES	REPRESENTATIVE QUOTE
IDENTITY & CULTURAL LOSS race belonging	"I was ripped up from my roots and brought here into this strange place, wherein everywhere I go, I was made to feel, to know that I don't belong" (M, Caribbean)
"CANADIAN" IMMUNITY migrant freedom	"HIV was mostly an African thing, a black people thing, a homosexual thing. Nothing else. I've never heard... that a white girl in HIV-positive" (M, Africa)
HEGEMONY OF SPONSORSHIP gender dependence	"I just kind of lay there. I just kind of let it happen … I felt like it was my fault for a long time" (F, Africa)

SS3.06

Physical and Sexual Violence Linked to Incarceration for Women Living with HIV in Metro Vancouver: Need for Trauma-Informed Care in Prisons and Post-Release

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Background: Despite Women Living with HIV (WLWH) being disproportionately criminalized and overrepresented within correctional facilities in BC and across Canada, there remains limited longitudinal community-based research with WLWH examining factors that make WLWH vulnerable to incarceration.

Methods: Data is drawn from SHAWNA *(Sexual health and HIV/AIDS: Women's Longitudinal Needs Assessment),* a community-based research cohort with WLWH (cis and trans women), aged 14+ who live or access HIV services in Metro Vancouver, Canada (2010-present). Baseline and semi-annual questionnaires are administered by trained community/ PRA interviewers alongside a clinical visit with a sexual health research nurse to support education and linkages to care. Multivariable logistic regression using generalized estimating equations (GEE) and an exchangeable working correlation matrix was used to prospectively model correlates of recent incarceration exposure over the seven-year period.

Results: Amongst 289 WLWH, the majority (76%) had been incarcerated in their lifetime. Over the follow-up period (2010-2017), 17% of participants experienced incarcerated. Participants contributed 1179 observations, with 76 events of incarceration reported. Over half of participants (57%) identified as Indigenous, 12% identified as African/ Caribbean/Black/other ethnic minority and 31% identified as White. In multivariable GEE analyses, younger age (AOR: 0.92 per year older, 95% CI: 0.89-0.96), recent homelessness (AOR: 2.81, 95% CI: 1.46-5.41), recent physical/ sexual violence (AOR: 2.26, 95% CI: 1.20-4.22) and recent opioid use (AOR: 1.83, 95% CI: 1.00-3.36), were significantly correlated with increased odds of recent incarceration. Lifetime exposure to physical and/or sexual violence by police (AOR: 1.97, CI: 0.97-4.02) was marginally correlated with increased odds of recent incarceration.

Conclusions: This research suggests a critical need for culturally safe trauma-informed interventions and policies for WLWH along their cascade of care, including during periods of incarceration and post-release in communities. Interventions must be women-centered, include housing and substance use supports, and address the cyclical nature of violence and incarceration.

SS3.07

Party-n-Play and Advances in HIV Biomedical Science: A Call for Combination Prevention Strategy

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Introduction: 'Party-n-Play' is condomless sex that occurs under the influence of drugs. Little is known about how advances in HIV biomedical science affect the sexual lives of gay, bisexual, and Two-Spirit men who Party-n-Play, in particular their dispositions regarding condom use, as well as HIV treatment and prevention. The Party-n-Play study explored how scientific artifacts such as antiretroviral therapy mediates sexual encounters and shapes the sexual practices of these men.

Methods: In-depth 1 hour interviews were conducted between October and November 2016, with 44 self-identifying gay, bisexual, and Two-Spirit men who lived in the Greater Toronto Area, and who used crystal methamphetamine, GHB, cocaine, ketamine, MDMA/ecstasy, and poppers before or during sex with another man during the previous month. Participants were recruited through social media, online postings, and word of mouth. Interview data were subjected to critical discourse analysis.

Results: The findings indicate that the HIV treatment optimism has solidified as a form of consciousness among study participants. Men who Party-n-Play often interpreted PrEP use and having an undetectable viral load as markers of safety in order to justify condomless sex. However, the solicitation of HIV status did not displace condoms as guarantors of safety from their once established position among men who Party-n-Play in Toronto. Many participants suggested that HIV is still the most terrifying thing that can happen to gay and bisexual men.

Conclusions: The study highlighted that while biomedical HIV discourses participate in the emergence of risk compensation practices among study participants, HIV treatment optimism has not translated into a unifying disposition among all men who Party-n-Play. It may be important to both continue promoting condoms and keep making PrEP accessible and affordable to gay, bisexual, and Two-Spirit men who Party-n-Play and those at high risk of blood-borne viruses, as part of combination prevention strategy.

SS3.08

Social Ecological Factors Associated with Condom Self-Efficacy Among Northern and Indigenous Adolescent Peer Leaders in the Northwest Territories, Canada

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Background: The Northwest Territories (NWT) has among Canada's highest rates of sexually transmitted infections (STIs) and youth suicide, and nearly one-fifth of persons report low income. There is an urgent need to address the intersections of poverty, mental health, and HIV/STI risk among NWT youth. Fostering Open eXpression Among Youth is an Indigenous HIV/STI prevention program that conducts a 10-day peer leader training, incorporating cultural traditions and Elder teachings. The study objective explored associations between social-ecological factors (resilience, food insecurity, depression) and condom self-efficacy among youth peer leaders in the NWT.

Methods: We conducted a cross-sectional online survey with youth peer leaders aged 14-17 from 18 NWT communities. We conducted ordinary least squares regression to test the mediating effect of resilience in the relationship between depression and condom self-efficacy. We then conducted a mediated moderation model to examine if food insecurity changed the strength of the relationship between depression, resilience, and condom self-efficacy.

Results: Most peer leaders (n=85; mean age: 15.8 years, SD: 2.1) identified as Indigenous (n=65; 77.4%) and women (n=70; 82.4%); 31% (n=27) identified as lesbian, gay, bisexual, or queer. Most (n=54; 70.1%) reported depressive symptoms, and 42% (n=33) reported food insecurity. Resilience mediated the relationship between depression and condom self-efficacy (b = 0.236, p<0.001, 95% CI = 0.129-0.343). In the mediated moderation model, the indirect effect of depression on condom self-efficacy through resilience was stronger for participants who reported food insecurity (b = 0.245, p<0.050, 95% CI = 0.049-0.440).

Discussion: We found that depression was associated with lower resilience, which in turn was associated with reduced condom self-efficacy among NWT youth. We also found an interaction between resilience and food insecurity on condom self-efficacy. Findings have implications for social-ecological interventions to address depression and food insecurity, and foster resilience, to build condom self-efficacy and reduce HIV vulnerabilities.

Basic Sciences: Antivirals, Microbicides, Biomarkers

Sciences fondamentales : Antiviraux, microbicides, biomarqueurs

BS4.01

Correlation of Plasma (1→3)-B-D-Glucan with Markers of Inflammation and Microbial Translocation during Primary and Chronic HIV Infection

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Background: HIV infection leads to gut damage and translocation of microbial products into the systemic circulation contributing to inflammation. Bacterial products and host acute phase proteins such as LPS, LBP and sCD14 are used as markers of microbial translocation; however such utility of fungal antigens is not defined. We therefore sought to determine the relationship of the fungal antigens (1→3)-β-D-glucan (βDG) and galactomannan with inflammation and microbial translocation in primary (PHI) and chronic (CHI) HIV infection.

Methods: A total of 131 participants without suspicion of fungal infection and/or GI symptoms were assessed in a cross-sectional analysis, including 74 PHI, 36 CHI and 21 uninfected controls. A subgroup of participants was prospectively assessed. Plasma βDG and galactomannan levels were quantified using Fungitell® and Platelia™ assays, respectively and were compared with age, sex, viral load, CD4 and CD8 T-cell counts, CD4/CD8 ratio, markers of gut damage (I-FABP), microbial translocation (LPS, LBP and sCD14) and inflammation (IL1-β, IL-6, IL-8 and TNF-α) at 5% α.

Results: Plasma βDG levels were elevated during PHI (59.4±33.5 pg/mL, p=0.043) and CHI (135.6±48.6 pg/mL, p<0.001) versus controls (30.6±10.8 pg/mL), while galactomannan levels were undetectable in all participants. βDG levels increased over 2-year interval in the untreated PHI (111.2±96.4 pg/mL p<0.001) and remained stable in

treated PHI. CHI on 12±4 years of ART had the highest βDG levels (195.7±53.8 pg/mL, p<0.001). A correlation of βDG was observed with viral load (r=0.430; p<0.001) in untreated participants, CD4 T-cell count (r=-0.249; p=0.009), CD4/CD8 ratio (r=-0.200; p=0.037), LBP (r=0.413; p=0.007), sCD14 (r=0.338; p=0.001), IL-6 (r=0.374; p<0.001) and IL-8 (r=0.561; p<0.001).

Conclusion: Plasma βDG levels were elevated during primary and chronic HIV infection and did not decrease on ART. Elevated βDG levels correlated with the validated markers of inflammation and microbial translocation and can be considered as a marker of HIV disease progression.

BS4.02

Changes in Brain Volume and Cognition in Mice Exposed In Utero to ABC/ 3TC-ATV/ RTV

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Background: Studies have reported adverse neurological outcomes in HIV-exposed uninfected children. Our objective was to investigate the impact of *in utero* exposure to combination antiretroviral therapy (cART) on infant brain development and cognitive behavior using advanced imaging techniques and well-validated behavioral testing methods in a mouse pregnancy model.

Methods: Gravid C57BL/6 mice were exposed to human-relevant plasma concentration of Abacavir (ABC)/Lamivudine (3TC)-atazanavir (ATV)/ritonavir (RTV) or water (control) starting from gestational day (GD) 1 to delivery. At GD 16, mice were euthanized; fetal weights were recorded and fetal morphology was assessed using micro-CT. A subset of the pregnant mice was allowed to carry to term and pups were accessed for developmental milestones. Postweaning, all mice were subjected to the novel object recognition test to assess non-spatial learning and memory. Alterations in brain regional volumes were assessed by magnetic resonance imaging.

Results: Fetuses exposed to cART were smaller than the controls [mean (SD); 0.32g (0.09) vs. 0.41g (0.06); P=0.007]. Micro-CT imaging showed significant volumetric changes in different regions of the fetal brains including a significant 7% decrease in the volume of the neocortex and amygdala (P<0.05) and a 7% increase in the hypothalamus in the cART-exposed group compared to controls (P<0.05); similar changes were observed in the adult brains by MRI at 8 months. The development of motor skills, tactile and olfactory reflexes were delayed in the cART-exposed offspring compared to controls (P<0.01). The cART-exposed mice had lower memory indices (MI) compared to controls (P<0.0001), and there was a positive correlation between MI vs. hippocampus CA1 and CA2 (r=0.68, P<0.0001), and MI vs. cingulate cortex (r=0.4, P=0.024)

Conclusion: Our data suggest that the *in utero* exposure to ABC/ 3TC-ATV/ RTV is associated with volumetric changes in key regions of the brain, developmental delays and cognitive deficits in a mouse model of pregnancy.

BS4.03

Every Site Counts: Detecting Low Frequency Variants in Non-Subtype B HIV-1 Integrase Associated with Drug Resistance in Uganda

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Next-generation (deep) sequencing provides a sensitive and cost-effective assay for low-frequency variants in diverse HIV-1 infections, but historically has been underutilized for non-subtype B HIV-1 infections in resource-limited settings. Here, we use deep sequencing to analyze samples from treatment-naïve individuals and individuals experiencing virological failure on combination antiretroviral treatment in Uganda. Our objective was to detect associations between low-frequency mutations in HIV-1 integrase and treatment outcomes in Uganda.

We retrieved a total of 362 archived plasma samples from patients at the Joint Clinical Research Centre (Kampala) with non-B infections, of which 85 were treatment-naive and 277 had experienced virological failure (VF) on first- (N=129), second-line (N=116) or raltegravir (RAL)-based (N=32) regimens. For each sample, we extracted HIV-1 plasma RNA and generated amplicon libraries for two overlapping regions spanning HIV-1 integrase for sequencing on an Illumina MiSeq. Sequencing reads were iteratively aligned with bowtie2 and subtypes were classified with SCUEAL. Amino acid presence/absence matrices were generated at a 1% frequency cutoff and multiple imputations (n=50) were analyzed by L1-norm support vector machine (SVM) classification with 5-fold cross-validation.

Overall, HIV-1 subtype A (47%) was the most frequent, followed by D (21%). More importantly, we detected several polymorphisms associated with integrase inhibitor resistance (E138K, G140A, Y143R, S147G, Q148K) in a small number of VF samples, although none of these polymorphisms were significantly associated with treatment outcomes. Our SVM analysis determined that the mutations T93A and V126M were the most strongly associated with first-line VF; T174A and K211T with second-line VF; and V165I and V151I with RAL-based VF.

Detecting minority HIV-1 variants with deep sequencing is important in settings where patients frequently discontinue treatment following VF, often leading to reversion to wild-type genotype by the follow-up visit. Our method describes a general strategy for detecting potential associa-

tions between the residual polymorphisms and treatment outcomes.

BS4.04

Vaginal Epithelial Barrier Integrity is Compromised by BV Associated Bacteria

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Background: Vaginal microbial dysbiosis, or bacterial vaginosis (BV), leads to increased genital tract inflammation and a higher risk of HIV acquisition. However, microbiome-epithelial interactions in the female genital tract (FGT) are not well understood. Here, we evaluated the functional pathway alterations and physiological consequences of vaginal epithelial cells exposed to BV-associated bacteria.

Methods: Using multiple *in vitro* model systems with vaginal VK2 and endometrial Hec1A epithelial cell lines, we assessed functional pathway changes by proteomics, and physiological effects by epithelial resistance (as measured by TEER), porosity of the barrier (measured by dextran-FITC movement), wound healing capability (imaging and TEER readings), and the ability to form multiple cellular layers (as measured by imaging) in the presence of *Lactobacillus crispatus, Gardnerella vaginalis, Mobiluncus mulieris* and *Prevotella amnii*.

Results: A total of 2343 proteins were identified with 11-19% proteins differentially abundant ($p<0.05$) in VK2 cells 24-hour post-inoculation (hpi) with supernatants from *G. vaginalis, M. mulieris* and *P. amnii* in comparison to *L. crispatus*. The top common functional pathways altered included cell-cell adhesion ($p<4E-6$), adherens junction ($p<1E-8$) and cadherin binding ($p<3E-8$), which were primarily downregulated (>70% of the proteins in each pathway). Unique effects were also observed by certain bacteria, including cytoskeleton signaling (*P. amnii*, $p<0.05$) and sertoli junction canonical pathways (*G. vaginalis*, $p=0.001$). In the physiological assays, *M. mulieris* caused the most detrimental barrier disruption including a decrease in epithelial integrity as measured by TEER (24hpi, $p<0.003$), increased porosity (24hpi, $p<0.0005$), and a delay in the wound healing ability (24hpi, $p<0.05$) of Hec1A cells *in vitro*.

Conclusions: These results demonstrate that BV-associated bacteria cause both proteome and physiological dysfunction of vaginal epithelial barriers. These may have implications for additional mechanisms by which HIV risk is increased in BV.

BS4.05

Differential Latency Reversion Mechanisms of Tat/TAR-independent HIV-1 in Lymphocytic, Monocytic/Macrophages Cell Lines

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Latency mechanisms of HIV-1 include transcriptional and post-transcriptional silencing at different levels. Several therapeutic approaches use latency-reversing agents (LRAs) to disrupt latency and accelerate viral reservoir exhaustion. Other therapeutic options would be to permanently block HIV replication in a deep-latency state. For each strategy, models are necessary in different HIV-permissive cells to study the mechanisms promoting or disrupting latency.

We used an HIV-1 Gag-zip-GFP latent model in which the HIV-1 promoter is independent from the Tat/TAR axis and is under the control of Doxycycline (Dox). This mutated virus is stably expressed in CEM-T4 (lymphocytes) and in THP-1 (Monocytes or Monocytes-Derived Macrophages, MDM) cells and allows the analysis of transcriptional and post-transcriptional events related to latency and latency disruption. We analyzed HIV-1 reactivation after treatment by Dox and various LRAs. The reactivation was analyzed at the transcriptional level by quantitative Reverse Transcription droplet digital PCR assay and at post-transcriptional levels by measuring GFP expression by FACS and western blots in CEM, THP1 monocytes and THP1 MDMs.

We reactivated HIV-1 expression by using different LRAs: JQ1, HMBA, Chaetocin, SAHA, Prostratin and Disulfiram and quantified Gag-zip-GFP. The reactivation patterns and cell viability are different for each LRA and for each cell type (lymphocytes, monocytes and macrophages) and we determined the optimal day of reactivation for each LRA and each cell type. By measuring the RNA levels at the proximal and distal HIV-1 transcripts, we analyzed total RNA vs elongated transcripts. We observed that most LRAs increase transcriptional elongation to a different extent in lymphocytes and monocytes whereas transcriptional initiation is mostly increased in macrophages. Additional assays are in progress to accurately pinpoint the differences between LRAs on transcriptional initiation vs elongation.

Our assays can be used to elucidate the precise mechanisms of latency and latency disruption for better therapeutic options.

BS4.06

Absence of HIV-1 Drug Resistance Mutations Support the Use of Dolutegravir in Treatment Naïve and Experienced Patients in Uganda

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Background: Dolutegravir (DTG) is effective against HIV in treatment naïve and experienced patients. However, data on prevalence of integrase strand transfer inhibitors (INSTIs) drug resistance associated mutations (DRMs) in Uganda is lacking. Here we screened for HIV-1 resistance to INSTIs and evaluated the potential use of DTG in treatment-naïve patients and in individuals experiencing virologic failure during first line (FL), second line (SL), or third-line (RL) combined antiretroviral therapy (cART).

Methods: We analyzed 400 Ugandan patient-derived samples upon failing a FL (N=158), SL (N=121), or RL (N=34, raltegravir [RAL]-based) regimens using sanger sequencing; of which 362 patients were tested using deep sequencing (Illumina Miseq) assay at ≥1 detection threshold, FL (N=129), SL (N=116) and RL, (N=32). HIV-1 drug susceptibility was interpreted using Stanford HIV database algorithm and Scueal was used for HIV-1 subtyping.

Results: HIV-1 subtype A (48%), D (25%), C (5%) and circulating/unique recombinant forms (22%). DTG resistance was not observed in treatment-naïve or individuals failing FL- or SL. Although over 56% of patients failing RL showed DRMs associated with resistance to RAL and/or elvitegravir (EVG), only 23.5% were predicted to have weak or moderate resistance to DTG. In RL failures, major mutations, T66A/K (2.9%,6.25%), Y143R/H (11.76%,12.5%), S147G (2.9%,3.1%), Q148K (2.9%,3.1%), G140A (2.9%, 3.1%), E138A/K/G (5.8%,6.2%), N155H (17.6%,25%) were detected by sanger and Miseq respectively. Only one patient harboring G140A, S147G, Q148K and E138K mutations was shown to be potentially resistant to DTG. Secondary mutations, T97A (8.75%,34.3%), M50I (6.5%,21.8%), L74M/I (3.0%,25%), E157Q (1.25%,9.4%), V151I/A (2.0%,25%) and G163R (1.5%,18.75%) were detected by sanger and Miseq respectively in patients failing RL.

Conclusions: Drug resistance was readily observed to all fourteen drugs currently available for cART in the country except for DTG. Primary integrase DRMs were found only in patients failing RL either as majority or minority members of the population.

Clinical Sciences: Youth and HIV

Sciences cliniques : Les jeunes et le VIH

CS4.01

HIV Reservoir Size in Peripheral Blood of Perinatally Infected Children: Results from EPIC4 (Early Pediatric Initiation, Canada Child Cure Cohort) Study

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Background: The primary objective of the multicenter Pan-Canadian EPIC4 study is to investigate the impact of early initiation of combination antiretroviral therapy (cART) on HIV reservoir size (HIV-RS) in perinatally infected children. Preliminary results for HIV-RS, and predictors of HIV-RS are described.

Methods: Cross-sectional analysis of children enrolled in EPIC4 with sustained virologic suppression (SVS). HIV-RS was estimated by quantification of proviral HIV DNA (pDNA) using ultrasensitive PCR and by prostratin stimulation assay (viral load in cell culture supernatants following stimulation of CD4+ T-cells with synthetic prostratin analog). HIV-RS and predictors of HIV-RS were evaluated according to age of initiation of cART that led to SVS.

Results: Sixty children (median age 13.7 years [9.5-17.2], 50% female, 45% immigrants, 56.7% black) were included. Median CD4 count 772 cells/μL (IQR 514, 1032). Median age of cART leading to SVS, age at SVS, and duration of SVS were 1.1 years (IQR 0.3, 5.6), 4.1 years (IQR 1.8, 10.4) and 7.1 years (IQR 4.6, 10.3), respectively. HIV-RS by pDNA and prostratin were highly correlated ($r=0.55$, $p<0.001$). Among those who achieved SVS with their first cART regimen, median HIV-RS was smaller if started ≤6 months of age than afterwards (pDNA: 7.75 [IQR 0.32, 18.00] vs. 134.13 [IQR 58.33, 232.18], $p=0.001$; prostratin: 15.1 [IQR 0, 62.0] vs. 74.8 [IQR 27.7, 723.6], $p=0.01$). HIV-RS by both assays correlated positively with age of cART initiation (pDNA: $p<0.001$; prostratin: $p=0.05$) and age of SVS (pDNA: $p<0.001$; prostratin: $p=0.04$) and negatively with proportion of life on effective cART (pDNA: $p<0.001$; prostratin:

p=0.02) and proportion of life with SVS (pDNA: p=0.002; prostratin: p=0.09); all correlations remained significant in analysis restricted to children without virologic blips (n=45).

Conclusions: Our results indicate good correlation of the two reservoir assays used. Very early initiation of cART significantly limits HIV-RS in peripheral blood.

CS4.02

Genotypic Resistance Profiles of HIV-infected Children Failing First-line Antiretroviral Therapy in Southern Ethiopia

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Background: While cART scale-up in resource-limited settings has significantly improved life expectancy in HIV-infected children, treatment failure remains a major concern. However, access to drug resistance testing, and thus our understanding of drug resistance in treatment-experienced children, remains limited. We investigate HIV drug resistance among children failing first-line ART in Hawassa, Ethiopia.

Methods: Dried blood spots were collected from 94 participants of the Ethiopia Pediatric HIV Cohort who were experiencing WHO-defined virologic treatment failure on first-line ART. Nucleic acids were extracted and HIV-1 Protease/RT codons 1-234 were amplified via PCR with and without an initial Reverse Transcriptase (RT) step and sequenced. RT-PCR and PCR-derived sequences were combined into a consensus sequence for resistance interpretation (Stanford Drug Resistance Database); resistance profiles of RT-PCR and PCR-derived sequences were compared.

Results: N=200 intact sequences were isolated from 90/94 participants (median 2 /participant), all subtype C. 73/90 (81%) participants harbored at least one major resistance mutation, where 62/90 (69%) harbored resistance to both NRTI and NNRTIs. Among participants with resistance, M184V (95%) and D67N (25%) were the most prevalent NRTI resistance mutations; Y181C (32%) and K103N (31%) were the most prevalent NNRTI resistance mutations. Of note, 42% of resistant profiles featured decreased susceptibility to all six WHO-recommended first/second-line NRTIs. Paired RT-PCR and PCR-derived genotypes were 87% concordant at the drug class level; however 58% of resistant participants exhibited at least one discordance between RT-PCR and PCR-derived genotypes at the mutation level, though mutation detection was not systematically biased towards either amplification method (p=0.57).

Conclusions: The observed high levels of dual-class resistance will significantly compromise the efficacy of WHO-recommended first and second-line regimens in this population. Repeat amplification increased the breadth of resistance mutations detected from blood spots. Enhanced and timely access to resistance testing would greatly enhance clinical-decision making capacity in this priority setting.

CS4.03

Predictors of Viral Suppression Among Children in Canada Initiating cART in the EPIC4 Cohort: Role of Socio-economic Factors

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Background: One of the keys to post-treatment control (viral remission) is sustained viral suppression (SVS) with cART. However, this strategy may not be realistic in children due to poor palatability of available ART formulations. The objective of this study was to identify predictors of SVS among children in the Early Pediatric Initiation of CART Canada Child Cure Cohort (EPIC[4]).

Methods: Retrospective case-control study. Using data from the EPIC[4] pediatric HIV cohort, the proportion of children who did vs. did not achieve SVS with their first cART regimen were compared, and predictors of SVS determined. Non-SVS was defined as ≥1 viral load rebound after ≥2consecutive undetectable viral load (VL) measures. Only patients with a minimum 1-year of follow-up data were included.

Results: 211 children were enrolled in the EPIC[4] cohort; mean age was 11.7 years (range 2.2-23 years). Nineteen had not yet initiated cART; among those on treatment, 44% were on NNRTI, 30% on protease inhibitor, and 26% on integrase inhibitor-based regimens. Fifty-six percent of children (118) had achieved SVS, and 33% reported at least one period of previously poor adherence. Children with SVS were more likely to be foreign born than Canadian born (85% vs. 67%, p=0.03), and less likely to have received social assistance (9% vs. 29%, p=0.01) or to have child protection services involvement (60% vs. 85%, p<0.01). There was no significant difference in SVS according to gender or baseline viral load. There was a higher proportion of SVS among those with any protective HLA allele (from among HLA B57, HLAB81, HLA B27 vs. none, 90 vs. 73%), though not statistically significant (p=0.12).

Conclusion: Only 56% of children enrolled in the EPIC[4] cohort achieved SVS. While adherence remains the overwhelming barrier to SVS, broader social determinants including income level and family disruption were identified important issues to address.

CS4.04

Microbial Translocation, Inflammation and Endothelial Activation in Vertically HIV-1 Infected Children

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Introduction: Impairment of gut immune defenses in HIV-1 infection permits microbial translocation (MT) that may result in chronic systemic inflammation and endothelial activation (EA). Intestinal fatty acid binding protein (I-FABP) is an epithelial cytosolic protein, abnormally detected in the circulation in association with MT. Levels of I-FABP have not been well documented in vertically infected children.

Methods: Cross-sectional analysis of plasma concentrations of I-FABP, markers of inflammation (TNF and IL-6), and EA (angiopoietin-2 (Ang-2), soluble vascular endothelial growth factor receptor-1 (sVEGFR-1), and soluble endoglin (sEng)). Plasma samples were collected from vertically HIV-1 infected children who had achieved sustained viral suppression (<40 copies/mL) with combination antiretroviral therapy (cART) enrolled in the Early Pediatric Initiation – Canadian Child Cure Cohort study (EPIC4). Samples were analyzed using commercial ELISA (R&D Systems).

Result: We included 98 patients (56% girls, median age 12 years) with median (IQR) duration of SVS 4.2 (1.9-7.5) years. The median (IQR) plasma concentration of I-FABP was 990 (490-1900) ng/mL. Plasma concentrations of TNF and IL-6 were correlated (ρ=+0.91, p<0.001), as were EA markers: Ang-2 with sVEGFR-1, Ang-2 with sEng, sVEGFR-1 with sEng (ρ>+0.40, p<0.001 for all comparisons). We used principal component analysis to derive an index of inflammation from a linear combination of TNF and IL-6, and an index of EA from a linear combination of Ang-2, sVEGFR1 and sEng, which explained 85% and 65% of the variance in markers of inflammation and EA, respectively. I-FABP was positively correlated with the index of inflammation (ρ=+0.70, p<0.001), and EA (ρ=+0.41, p=0.004).

Conclusion: Despite excellent virologic control with cART, we found evidence of persistent enterocyte injury suggestive of MT in children with perinatally acquired HIV-1 infection. This was associated with systemic inflammation and EA in pediatric HIV-1 infection. Future studies should examine long-term outcomes (e.g., cardiovascular events) in children with elevated I-FABP.

CS4.05

A Population-based Study of Health Outcomes of HIV-exposed Uninfected Children Using Ontario's Administrative Health Databases

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Background: Maternal treatment with combination antiretroviral therapy (cART) in pregnancy has led to a generation of HIV-exposed uninfected children (HEUs) globally and in Canada. Some data suggests increased immunologic/infectious morbidity in HEUs. We utilized Ontario's administrative health databases to estimate rates of these morbidities in Ontario-born HEUs.

Methods: A retrospective population-based study was conducted comparing diagnoses among children of women living with HIV to matched HIV-unexposed children born between 01-01-2002 and 31-12-2015. Each HEU was matched with up to 5 non-HEU children based on: year of birth, maternal age, mother's region of origin, calendar quarter of birth, neighbourhood income quintile, local health integrative network, and urban/rural residence. Child health outcomes included: all-cause and infection-related hospitalizations from 3-23 months of age. Crude rates of outcomes were calculated and regression analyses adjusted for maternal risk factors/comorbidities, pregnancy syndromes and infant characteristics were conducted to determine whether HEUs were at greater risk of negative health outcomes. Preterm infants (born <37weeks gestation) were excluded from this analysis.

Results: A total of 1004 HEUs and 5033 matched non-HEU children were identified. All-cause (52.67 per 1000 person-years [PYs]) and infection-related hospitalizations (7.60 per 1000 PYs) among HEUs were higher than in matched non-HEUs (41.28 and 4.95 per 1000 PYs, respectively), with unadjusted hazard ratios (95%CI) of 1.289 (1.014-1.632) and 1.499 (0.806-2.788), respectively. Adjusted hazard ratios were 1.065 (0.811-1.399) and 1.002 (0.436-2.304) per 1000 PYs, respectively.

Conclusions: HEUs had higher rates of all-cause and infection-related hospitalizations than matched controls, although adjusted hazard ratios showed no elevated risk of these outcomes compared to matched non-HEUs. This suggests a strong contributing role of maternal factors to the increased rates of outcomes, and warrants further investigation in this growing vulnerable population.

CS4.06

Blood mtDNA Levels are Persistently Elevated from Birth into Early Life (0-3y) in HIV-Exposed Uninfected Children Exposed to cART in utero

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Background: Maternal combination antiretroviral therapy (cART) during pregnancy effectively prevents vertical HIV transmission. However, *in utero* exposure to antiretrovirals could have long-term effects on HIV-exposed uninfected children (HEU). Some antiretrovirals can cause mitochondrial toxicity and affect mitochondrial DNA (mtDNA) quantity and/or quality. Our objective was to compare blood mtDNA content at birth and over the first 3 years of life between HEU and HIV-unexposed uninfected children (HUU), and investigate relationships to cART exposure.

Methods: Children of women living with HIV and HIV-negative women were enrolled in the CARMA cohort. In samples from 324 HEU (214 with ≥2 specimens) and 306 HUU (single specimens), blood mtDNA content was measured by multiplex qPCR. A subset of these children was age- and sex-matched 1:1 for cross-sectional comparison of mtDNA content over the first 3 years of life. Factors important univariately ($p<0.1$) were considered in multivariable linear regression models.

Results: Among age and sex-matched children (n=214:214), HEU had persistently higher mtDNA content than HUU ($p<0.01$) throughout the first 3 years of life. mtDNA content of HEU was categorized by type of *in utero* cART, and compared to HUU. At birth, lower gestational age (GA) was the only factor independently associated with higher mtDNA content ($p=0.003$) in a model that included GA and maternal smoking during pregnancy. Among infants born at term (GA≥37w), GA was no longer associated with birth mtDNA content, and only HEU exposed *in utero* to ritonavir-boosted PIs in combination with ABC+3TC ($p=0.009$) or AZT+3TC ($p=0.03$) had higher birth mtDNA content compared to HUU. HEU mtDNA content did not change during the neonatal prophylaxis period.

Conclusions: HEU children have higher mtDNA content at birth, an effect that persisted into early life (age 3). This may represent a long-term effect, resulting from adaptive mitochondrial biogenesis in response to *in utero* stressors.

Epidemiology and Public Health: Implementation Science

Épidémiologie et santé publique : Science de la mise en œuvre

EPH4.01

Identifying 'Core Areas' of HCV Infection in British Columbia, Canada

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Background: 'Core areas' of transmission for bacterial sexually transmitted infections have been described; however, research on characterizing core areas for hepatitis C virus (HCV) is limited. We used geographic mapping and spatial analysis methods to identify distinct core areas of HCV infection in British Columbia using the British Columbia Hepatitis Testers Cohort (BC-HTC) during 1990-2013.

Methods: The BC-HTC includes all BC residents tested for HCV (~1.5 million; 1990-2013). HCV core areas were identified spatially and temporally for five time periods (1990-93, 1994-98, 1999-2003, 2004-08 and 2009-13) through thematic mapping, Kernel Density Estimation (KDE), Hotspot analysis (HSA) and cluster analysis (discrete Poisson) at the Census dissemination area level in ArcGIS and SatScan.

Results: Spatial analytic methods showed consistency in identifying HCV core areas. 1) KDE showed core area expansion from downtown of major cities in Metro Vancouver (MV), Vancouver Island (VI), and Northern BC (NBC) during 1990-1998, to smaller cities in MV and Interior BC (IBC) from 2000 onward. 2) HSA showed statistically significant hotspots in MV (Vancouver downtown), NBC (Prince George) and VI from 1990- 2008 with expansion to other urban areas in MV (Surrey and Abbotsford) from 1990-2013. 3) Spatiotemporal cluster analysis (adjusted for injection drug use, HCV testing, age, sex, material and social deprivation) revealed a persistent most likely cluster in MV (Vancouver downtown) from 1990- 2008 with secondary clusters in NBC and IBC urban areas. A secondary cluster was observed for VI (1990-2003). Recently (2009-13), a most likely cluster was observed in NBC (Prince George) with a secondary cluster in MV (Vancouver).

Conclusions: Persistence of areas with high HCV rates in Vancouver and Prince George over past 20 years indicates

core areas of HCV transmission. Identification of core areas can assist targeting interventions to these areas and evaluate the impact of programs and interventions over time.

EPH4.02

Spatial-temporal Epidemiology of the Syphilis Epidemic in British Columbia, 2005-2016

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Background: Canada continues to experience an unabated and concentrated epidemic of infectious syphilis, with a majority of cases in most urban jurisdictions occurring among gay, bisexual, and other men who have sex with men (gbMSM). In British Columbia (BC), approximately half of gbMSM diagnosed with syphilis are living with HIV. Spatial-temporal analyses can inform novel public health responses to the syphilis and HIV epidemics by describing geographic and temporal trends and clusters of diagnoses.

Methods: We used geographic information systems (ArcGIS) to map infectious syphilis cases among males in BC during 2005-2016, and space-time scan statistics (SaTScan) to detect areas with significantly elevated rates. Cases were geocoded to 3-digit postal code of residence. Clusters lasting ≥5 years were classified as "core", those lasting <5 years as "outbreaks". Primary analysis used Census counts of adult males as denominators. For secondary analysis, maps were re-constructed using two alternative weights: estimated number of gbMSM (based on the 2014-15 *Sex Now* survey), and estimated number of syphilis tests.

Results: A total of 3,367 syphilis case reports were mapped. Three clusters were identified: Downtown Vancouver (core), where the relative risk (RR) of being a case was 16.9 times higher inside the cluster than outside the cluster during 2007-2016; New Westminster and Northwest Surrey (outbreak; RR=4.3; 2013-2016); and Victoria (outbreak; RR=2.0; 2015-2016). Epidemic curves were synchronized across core, outbreak, and non-cluster regions. Elevated rates of syphilis in Downtown Vancouver and New West/Northwest Surrey were predicted by the spatial distribution of gbMSM. The Downtown Vancouver cluster was also predicted by the spatial distribution of testing.

Conclusions: The BC syphilis epidemic is concentrated in three geographic clusters in relatively close proximity. Increased testing may reveal other geographic clusters. Spatial-temporal surveillance can be used to identify emerging outbreaks and offer increased resolution to focus public health interventions.

EPH4.03

Geo-social Networking App Use and Loneliness Among HIV-Positive and HIV-Negative Gay and Bisexual Men in Vancouver, British Columbia

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Background: Geo-social networking apps (GSN) use has been associated with negative outcomes, including loneliness. The aim of this study was to estimate the strength of this relationship after adjusting for known confounders.

Methods: We analyzed longitudinal data collected from February 2012 to February 2016 in the Momentum Health Study, a cohort of gay and bisexual men in Metro Vancouver. Participants completed a computer assisted self-interview every six months, including the De Jong Gierveld 6-item scale for overall, social, and emotional loneliness. We categorized exposure to GSN apps: "never", "about once a month", and "more than once a month". A multivariable, multi-level mixed model was generated to estimate the strength of the association between GSN app use and loneliness, stratified by HIV status ($p<0.05$ significant).

Results: We followed 774 participants at baseline and those with follow-up visits to comprise a total of 3161 observations. Of these, 29.6% were HIV-positive and 35.5% were 30 years of age or younger. In multivariable models that adjusted for age, sexual identity, being out as gay or bisexual, income, any lifetime doctor-diagnosed mental health condition, and Facebook use, HIV-positive participants who reported more than once a month use of were significantly more likely to be classified as lonely overall (Adjusted Odds Ratio [AOR]: 1.95; 95% CI: 1.02–3.72) compared to never users. For HIV-negative participants, no significant association was observed (AOR: 1.37; 95% CI: 0.97 – 1.93). Among the sub-scales, no significant association was observed with the social sub-scale, but HIV-positive GNS app users were significantly more likely to be classified as emotionally lonely (AOR: 2.09; 95% CI: 1.13 – 3.87).

Conclusions: GSN app use is associated with higher overall and emotional loneliness, but not social loneliness, among HIV-positive gbMSM. These findings have implications for online/mobile outreach efforts and a need for complementary mental health interventions.

EPH4.04

Can Geosocial Networking Applications Aid in Health Service Delivery Efforts?

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Background: Gay, bisexual, and other men who have sex with men (GBM) who utilize hookup apps to meet sexual partners employ a variety of seroadaptive strategies to prevent HIV transmission/acquisition. However, effective seroadaptive behavior requires individuals to know their HIV status. Yet, it is difficult to develop programmatic interventions for GBM as their spatial distribution outside of gay-centered neighborhoods is unknown.

Methods: Therefore, we used a popular geo-social networking application to estimate the spatial density of app-users across rural and urban Metro Vancouver. Multiple regression models were then constructed to identify the relationship between app-user density and neighborhood-level factors including clinic access and dissemination area-level characteristics from the 2011 Canadian Census and 2011 National Household Survey.

Results: Figure 1 maps the app-user density in Metro Vancouver. In summary, 5-kilometer catchment areas provided clinic access coverage for most app-users and sexual health clinics were of highest density in neighborhoods with high app-user density. Further, while spatial variance in app-user density was strongly associated with the general population density ($p < 0.001$), other neighborhood-level factors were also significant. App-user density was associated with areas that had a higher proportion of younger ($p < 0.001$), single ($p < 0.001$), non-visible minority ($p < 0.001$), immigrant ($p < 0.001$), and non-college educated ($p < 0.001$) residents.

A. Study Setting Image: https://goo.gl/oBLjND	**C. Observed Density of App-Users Superimposed Over Dissemination Area Population Density.** Image: https://goo.gl/D7Um78
B. Sampling Strategy for Mapping App-User Density Image: https://goo.gl/LvWSUq	**D. Clinic Catchment Areas (5 km) Superimposed over Kriging-Interpolated App-User Density. Image:** https://goo.gl/RJzXQo

Figure 1. Maps of Study Setting, Sampling Strategy, Observed App-User Density, and Spatial Overlap with Clinic Access

Conclusions: Overall, this study highlights an additional strategy by which care providers, planners, and community leader might leverage app-user geolocation information and census data to target app-users and tailor appropriate services to meet their needs.

EPH4.05

Predicting Patient Stability for Differentiated Care with the WelTel Mobile Phone Intervention: A Retrospective Analysis

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Background: Differentiated service delivery models are emerging as an approach to improve the quality and cost-effectiveness of HIV care. Under this framework, health systems are encouraged to provide support to people living with HIV (PLWH) based on their level of 'clinical stability', thus optimizing resource allocation and improving engagement of vulnerable populations. However, clinical indicators of stability, such as CD4 and viral load, are assessed infrequently and detect patients when they have already disengaged from care. WelTel is an interactive mobile phone intervention used to support HIV treatment adherence that sends weekly check-in text messages (SMS) to patients and tracks responses. We hypothesized that responsiveness to SMS would predict clinical stability.

Methods: We tested the ability of participant's responses in the WelTel Retain trial (NIH #R01-MH097558) to classify and predict stability of PLWH in Kenya. We defined stable patients *a priori* as those who attended two or more clinical visits for HIV care, separated by at least six months, within a 12-month period. We assessed response rates to weekly SMS check-ins at 52 weeks post-enrolment, and compared between stable and unstable patients using the Mann-Whitney U-test. We also modeled response rates over time using linear regression.

Results: Stable patients (n=249) had a median response rate of 72.4% (IQR: 49.0-84.9%), significantly higher than unstable patients (n=100) with a median response rate of 32.6% (IQR: 11.9-60.4%, $p<0.001$). Stable patients were also more likely to respond to check-ins during the first four weeks than unstable patients (RR=2.43, 95% CI: 1.54-3.85, $p<0.001$), and maintained a more consistent response rate after 52 weeks.

Conclusions: Patients' texting profiles and level of responsiveness to the WelTel service significantly differentiated them into stable and unstable classifications. This may provide greater opportunity to detect stability in care using patient-centered methodology, and could allow for earlier detection of clinical instability.

EPH4.06

Dissemination and Implementation of National Practice Guidelines in Peer Health Navigation for People Living with HIV

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Background: For a person living with HIV to achieve optimal health outcomes, they need access to a continuum of services: HIV testing and diagnosis, linkage to appropriate medical care and other health services, support while in care, access to ART if and when they are ready, and support while on treatment. Estimates from several Canadian provinces demonstrate that people living with HIV are not optimally engaged across the HIV continuum of care. National practice guidelines in peer health navigation were developed to:

- improve the quality and consistency of peer health navigation programs
- improve the effectiveness of peer health navigation programs to positively impact the health and well-being of people living with HIV
- build on existing local/regional models and materials, many of which were developed and informed by people living with HIV

Methods: CATIE conducted an extensive peer-reviewed and grey literature review. We also convened a 13-member national expert working group of researchers, clinicians, public health practitioners, program planners, frontline service providers, and people living with HIV. The working group informed and developed research-based and practice-based guidelines on peer health navigation for people living with HIV.

Results: Evidence-based and practice-based recommendations are available on assessing peer and agency readiness; integrating navigators into host agencies; recruiting, selecting, training, and supervising navigators; navigator roles and responsibilities; related ethical and policy considerations; and program evaluation. Target groups for the guidelines include program planners and service providers in community-based organizations; public health program planners; and HIV clinical care providers and administrators.

Dissemination: The guidelines are intended to provide direction to agencies considering the development, implementation or strengthening of peer health navigation programs. An online portal accessible through the CATIE website will house the guidelines, along with a collection of existing Canadian and international program tools to support the implementation of peer navigation programs.

Social Sciences: Advancing Service Delivery

Sciences sociales : Faciliter la prestation des services

SS4.01

"It'd be another thing to live for": Supporting HCV Treatment and Cure Among Indigenous People Impacted by Substance Use in Canadian Cities

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Background: Historical and ongoing impacts of colonization have led to the overrepresentation of Indigenous people impacted by substance use and HCV infection in Canada. It is therefore critical to ensure Indigenous people's equitable access to the new more tolerable and effective DAA HCV treatments. However, very little is understood regarding ways to support the self-determination of Indigenous patients within the HCV care continuum, including strengths-based culturally-safe ways to promote adherence, cure, and long-term wellbeing.

Methods: Thirty-five semi-structured interviews were carried out with Indigenous participants from the Cedar Project (n=20, Vancouver & Prince George, BC) and the Canadian Coinfection Cohort (n=15, Vancouver & Sudbury, ON). Interpretive description identified patterns and themes to inform clinical approaches and public health programming. Themes and related recommendations were validated by Indigenous health experts and those with lived experience prior to coding and re-contextualization.

Results: Overall, 63% of the participants were women, the median age was 36 years, 63% were HIV/HCV co-infected, 51% were actively injecting drugs, and 17% had received DAA HCV treatment and been cured. Participants' recommendations expanded understandings of structural, systemic, and individual barriers to HCV treatment. Pragmatic ways to integrate individual self-determination and Indigenous concepts of whole-person wellness into the HCV continuum of care were highlighted. Three broad themes were identified: 1) ensure culturally-safe and competent physician-patient relationships; 2) build systems that support routine, encourage connection to community, and involve intimate partners; 3) address structural and lifetime causes and triggers of substance use.

Conclusion: Participants envisioned not only better physical health after HCV cure, but also many emotional, mental, spiritual, and social benefits. The HCV continuum of care must be adapted to address systemic barriers within the healthcare system, and build upon the strengths of Indigenous patients to support long-term whole-person wellness

SS4.02

Evaluating Knowledge and Attitude Change among Participants in a Participatory Filmmaking an[illegible]V/AIDS Education Workshop for Indigenous Y[illegible]

Rachel Landy

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Indigenous youth are overrepresente[illegible] in the HIV/AIDS epidemic in Canada. Arts-based ini[illegible] have become increasingly popular strategies f[illegible]HI[illegible]DS education and prevention with Indig[illegible]us [illegible]uth. However, there is a dearth of research on their [illegible]ffectiveness, and acceptability. The aim of this stud[illegible]va[illegible] to evaluate Indigenous youths' HIV/AIDS k[illegible]ov[illegible]e and attitude change after participation an arts-[illegible]se[illegible]IV/AIDS education workshop.

Eleven self-iden[illegible]ng I[illegible]genous youth, ages eleven to seventeen [illegible]tte[illegible]de[illegible].5-day participatory filmmaking workshop [illegible]te[illegible] part of a community-based research projec[illegible]ng the use of the arts in HIV/AIDS education[illegible]d p[illegible]ev[illegible]tion with Indigenous youth in Labrador. Participa[illegible]filmmaking was used to engage participants and create dialogue about HIV/AIDS, sexual health, and health in general.

A mixed methods design was employed to assess knowledge and attitude change post-workshop. Participants completed a pretest and posttest immediately before and after the workshop. Participants were interviewed about their experiences approximately two weeks after the workshop. Content analysis was used to analyze the interview transcripts for themes related to HIV/AIDS knowledge and attitude change.

The participants significantly improved their HIV/AIDS knowledge and attitudes after the workshop.

HIV/AIDS knowledge and attitude change was significant for overall scores [Mean difference (M) =6.3; 95% CI 5.2-7.4]; knowledge scores (M = 3.9; 95% CI 2.8- 5.0); and attitude scores (M = 1.8; CI 95% 0.7-2.9).

Analysis of the interview transcripts revealed that the participants: learned what HIV is; learned how HIV is transmitted; learned about stigma; operationalized new knowledge; learned about setting boundaries/healthy relationships; and attributed their knowledge and attitude change to the environment created through participatory filmmaking.

These findings suggest that participatory filmmaking is a promising strategy for HIV/AIDS education and prevention with Indigenous youth. Improving HIV/AIDS knowledge and attitudes is essential to addressing the overrepresentation of Indigenous youth affected and infected by HIV/AIDS in Canada.

SS4.03

Community-Based Identification of HIV-Infected Individuals: A Focus on Vulnerable Populations

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The WHO has proposed that, as part of the worldwide response to the HIV pandemic, 90% of people living with HIV be identified and engaged in care by 2020. In Canada, 19% of new HIV infections occur in vulnerable populations (including many people who use drugs, or PWUD) disengaged from services. To address this issue, we have developed a model of community pop-up clinics (CPC) to interact with the population of Vancouver's Downtown Eastside (DTES) to provide point-of-care HIV diagnostic services and design a plan of engagement in care.

Weekly CPCs are held at community centres in the DTES. Rapid HIV testing is offered using the OraSure saliva assay. If a positive result is obtained, immediate medical consultation is performed and an incentivized clinic appointment is offered. At this appointment, a plan of HIV treatment is developed along with a plan for engagement in multidisciplinary care to address all medical, social, psychiatric, and addiction-related needs.

Between 06/13-11/17, we have tested 3,451 individuals, of whom 98 (2.8%) were found to be infected with HIV. Of these, 79 (81%) were successfully engaged/re-engaged in care, with 51 returning to a provider with whom they were previously engaged, and 28 seen at our clinic. Of these 28, 17 were started on antiretroviral therapy, with 11/11 who remained on such therapy achieving virologic suppression, with 2 deceased and 4 lost to follow up.

Despite extensive efforts to diagnose HIV infection in people living on the DTES, a significant number of patients remain undiagnosed or have disengaged from follow-up. The CPC model we have developed is particularly effective at identifying these individuals, and proposing a means of re-engaging in care. This has been accomplished for many patients, but additional strategies must be developed to achieve the WHO objectives to address the HIV pandemic.

SS4.04

We're Not the Condom Police: Investigating How Front-line Workers in Ontario Talk About HIV Risk

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Front-line HIV workers play a critical role in knowledge-translation and are an instrumental link between the current literature and the people most at-risk for HIV. How-

ever, the way people use and interact with HIV information is influenced by a number of factors. This project explored the challenges that front-line HIV workers face and their successful strategies, in order to better understand how to help those at-risk access and use critical HIV information.

Focus groups were conducted with Ontario front-line HIV workers (*n*=20). A thematic analysis was conducted using NVivo and a follow-up survey is being conducted to reach a larger sample to ensure the congruency of the themes and to collect additional information.

A number of important themes emerged in our analyses. For instance, stigma presented a significant barrier in a number of important ways: HIV stigma makes it difficult for front-line workers to reach some of those at risk because these people are uncomfortable with the topic of HIV, some are also concerned about the social consequences of being seen talking to HIV workers, and individuals' stigmatization of those impacted by HIV means that some groups don't recognize that they too are at risk. One of the biggest challenges reported by workers was related to statistical and other numeric data related to HIV. A large proportion of front-line workers were not comfortable discussing numeric information in their work because either they didn't feel the people they talk to would not understand it or they themselves had difficulty with it. One of the most effective strategies workers described was using their language and tone to create judgement-free spaces to build trust and comfort. This is a significant strength as it may help alleviate some of the difficulties introduced due to internalized HIV stigma. Lessons learned and implications will be discussed.

SS4.05

HIV-Related Healthcare Access for Trans Women Living with HIV: A Systematic Review

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Background: Most HIV research pertaining to trans women, a population disproportionately affected in the global HIV epidemic, discusses HIV prevention. Access to HIV-related healthcare post-diagnosis is of pivotal importance to maximize the health and wellbeing of trans women living with HIV (WLWH). This systemic literature review identifies studies describing HIV-related healthcare access among trans WLWH in the US and Canada.

Methods: We conducted this systematic review using the Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) guidelines. Proquest, EBSCO, OVID, Scopus, and Google Scholar were searched for empirical literature detailing trans women's access to and experiences with HIV-related healthcare from 1990-present. Included studies: (1) contained empirical data drawn from qualitative or quantitative studies; (2) included data specific to trans WLWH; (3) discussed HIV-related healthcare access. Two reviewers independently abstracted key study characteristics (e.g., study designs, key findings).

Results: Fifteen identified studies focused on HIV-related healthcare access for trans WLWH, including quantitative (n=8; cross-sectional survey (n=6); retrospective cohort study (n=2); sample sizes 22-166) and qualitative (n=7; focus groups (n=3); semi-structured individual interviews (n=2); focus groups and interviews (n=2); sample sizes 10-38) studies. Quantitative studies suggested that trans WLWH experience lower retention in care, ART use, and adherence, compared to cisgender adults. Qualitative studies further suggested trans-specific factors may enable (e.g., access to gender-affirming healthcare) or constrain (e.g., transphobia) HIV-related healthcare access and highlight intersecting oppressions (e.g., transphobia, HIV-related stigma, transmisogyny, gender non-conformity stigma) which constrain women's access to HIV-related healthcare at structural (e.g., lack of availability of culturally-relevant services), interpersonal (e.g., provider discrimination) and intrapersonal (e.g., depression) levels.

Conclusions: This systematic review suggests that HIV-related healthcare access disparities exist and are shaped by stigma and discrimination. Studies are urgently needed that move beyond documenting disparities to further explore barriers and facilitators to healthcare access for trans WLWH.

SS4.06

A Case Management Nursing Perspective on the "War on HIV/AIDS:" A Critical Reflection on the Meaning of "Engagement" in Public Health Practice in Ontario

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Modern epidemics are commonly conceptualized as *wars*: "The War on Ebola;" "The War on SARS;" "The War on HIV/AIDS." The purpose of this study is to examine how equating the management of infectious diseases with war shapes public health policies, nursing practices, and the experiences of people living with HIV/AIDS. A critical ethnography was undertaken with 22 public health nurses involved in HIV case management across Ontario to describe the strategies used to engage people newly diagnosed with HIV and their contacts in HIV care, and trace the influence of current policies on nurses' decision-making and client outcomes. A poststructuralist feminist and critical geographical lens was employed to help map the organizational structure of case management, examine the operational meaning of *engagement* in policies and practice, and identify constraints and innovations in nursing care that mark the boundaries of nurses' engagement with clients in public health. The main finding is that a nursing conceptualization of engagement is invisible in the 90-90-90 indicators and policies used to guide the HIV response. The focus is on biomedical and epidemiological

concerns. While engaging clients in medical care and surveillance are integral to case management, in nursing care the goal of engagement is for clients "to feel supported" regardless of their willingness or ability to engage in testing and treatment. Nurses describe the steps of case management as "learning a client's story," "starting where the client is at," "sharing mutual concerns," "matching information to needs" and "facilitating connections." The map, therefore, outlines new directions for research and policy development in public health about how to better support clients' efforts to live with the virus. Several concrete ideas can be drawn from nurses' experiences on the *frontlines* about how more effective partnerships could be formed with people feeling marginalized in the present response to HIV/AIDS.

Poster Presentations – Présentation d'affiche

Basic Sciences

Sciences fondamentales

Antivirals, Microbicides and Mechanisms of HIV Resistance

Antiviraux, microbicides et mécanismes de résistance au VIH

BSP1.01

HIV VPR Upsets AK2 Expression: Implications for TFV Resistance & Disease Development

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Background: Tenofovir (TFV) is a reverse transcriptase (RT) inhibitor central in treatment and prophylactic anti-HIV regimens. Surprisingly, global TFV resistance rates are higher than expected. While TFV resistance typically emerges via RT mutation, we observed **TFV resistance in the absence of RT mutation**. Thus, we hypothesized another HIV-1 protein may affect TFV efficacy. Since it is already known that TFV must be diphosphorylated by adenylate kinase 2 (AK2) for anti-HIV activity *and* Vpr affects AK2 expression, **we investigated the role** of HIV-1 Vpr in the development of TFV resistance.

Methods: *Generation & Genotyping of TFV Resistant HIV-1*. To select for resistance, stimulated cord blood mononuclear cells were infected at low MOI and cultured in increasing TFV concentration over time. Parallel passage without TFV served as control. HIV-1 RT and Vpr genes were sequenced and analyzed from samples throughout experimentation.

Evaluation of HIV-1 Vpr effect on TFV efficacy. HIV-1_{YU2} coding (WT) and not coding for Vpr (Δvpr) were propagated from molecular clones. Clonal HIV-1_{YU2WT} and HIV-$1_{YU2\Delta vpr}$ were evaluated for TFV susceptibility in two variations of a PBMC-based HIV-1 replication assay. Anti-HIV activity against each variant was evaluated via quantifying RT activity in cell supernatants day 6 post-infections.

Evaluation of Vpr effects on AK2. AK2 expression was evaluated in the context of Vpr overexpression and PBMC-based HIV-1 replication assays via Western blotting and qRT-PCR.

Results:

- **HIV-1** *vpr* mutations emerged under TFV pressure as early as 8 weeks in accord with TFV resistance development ($\geq$10 fold), yet no RT mutations were observed.
- **HIV-$1_{YU2\Delta vpr}$** exhibited TFV resistance in PBMC-based HIV-1 replication assays.
- **Vpr affected cellular AK2 protein expression.**

Conclusions: HIV-1 Vpr contributes to TFV resistance by upsetting AK2 expression. The effect of Vpr on AK2 expression has important clinical implications as absence of AK2 results in reticular dysgenesis, a rare severe combined immunodeficiency disorder.

BSP1.02

A Fluorescence-based High-throughput Assay for the Binding of HIV-1 Integrase to Viral RNA

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HIV-1 integrase strand transfer inhibitors (INSTIs) are the latest class of antiretroviral drugs to achieve widespread use against HIV-1 infection in western countries due to their effectiveness against HIV replication. Dolutegravir (DTG) appears to display an improved barrier against the development of resistance over earlier INSTIs, and resistant mutants, such as R263K, show low infectivity. It was shown that integrase (IN) binding to viral RNA is essential for proper viral particle formation and infectivity. However, drug resistant IN variants were not characterized. Here we present data related to the development of a high-throughput assay for the characterization of integrase protein binding to viral RNA. To this end, a fluorescently labeled RNA element representing the 57 nucleotide TAR sequence was used as a probe. Wild-type integrase and two variants, R263K and K264A/K266A, are characterized in this study. The K264A/K266A combination of substitutions was previously shown to display markedly reduced affinity for viral RNA species and produce non-infectious eccentric virions. Our assay will be used to characterize IN variants that are resistant to INSTI, including that bearing the R263K substitution conferring limited resistance to DTG, to determine if altered RNA binding helps to explain the low infectivity of this mutant. These results may also shed light on the high genetic barrier against the develop-

ment of resistance to DTG. Furthermore, these studies may inform future integrase inhibitor development and thereby support efforts to cure HIV infected patients since antiretroviral therapy is currently considered to be an essential component of most cure strategies.

BSP1.03

The S153F/Y and R263K Integrase Cabotegravir/ Dolutegravir-resistance mutations are Incompatible

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Clinically approved integrase (IN) strand-transfer inhibitors (INSTIs) include raltegravir, elvitegravir and dolutegravir (DTG). Cabotegravir (CAB) and bictegravir are currently in late stage development. In vitro, the emergence of resistance against DTG or CAB can be associated with the development of the R263K or S153Y/F IN substitutions. Our in-vitro selection experiments suggest that R263K and S153Y/F cannot coexist. S153 is a conserved residue adjacent to the IN active site that is involved in LTR binding. S153Y and S153F are not fully characterized. This study was designed to understand the impact of the S153F/Y substitutions, alone and in combination with R263K on IN strand-transfer activity, viral infectivity and INSTI resistance.

Our in vitro strand-transfer assays showed that the single S153F/Y substitutions decrease the overall activity of recombinant INs. The reduction was more notable with S153F (over 90% reduction) than S153Y, potentially as the result of the loss of the hydroxyl group vs. its conservation with either substitution. The combination of R263K with S153Y led to a 96% reduction in IN strand transfer activity compared to WT. Interestingly, combination of S153F with R263K enhanced DNA binding affinity compared to S153F alone but could not completely restore IN activity. In agreement with these observations, S153F caused a larger defect on viral infectivity and replication than S153Y, which only showed minor reductions in both outcomes. Both double mutant viruses were non-infectious and could not replicate in PM1 cells. In terms of INSTI susceptibility, S153F/Y confers modest levels of resistance against INSTIs in-vitro (less than 3-fold relative to WT).

S153F/Y emerged early during DTG/CAB selection as transient substitution that impaired enzyme activity, infectivity and replicative capacity, effects that were more marked for S153F. This helps to explain why S153F is rarely reported clinically. Our results also show that the DTG/CAB-resistance substitutions S153F/Y and R263K are incompatible.

BSP1.04

Detection of the R263K and M184V Resistance Mutations in Proviral DNA from HIV-Positive Individuals Successfully Treated with Dolutegravir

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Drug resistance against 3-drugs dolutegravir-based antiretroviral therapy is uncommon in treatment-naïve individuals. Integrase inhibitor-naïve, treatment-experienced people occasionally suffer from the development of the R263K substitution in viral integrase that can lead to virological failure. The dolutegravir-resistant R263K substitution typically results from a simple G-to-A transition, raising the question of why virological failure is not more frequent in individuals who use dolutegravir-based therapy. This question is particularly poignant given the current development of 2-drug dolutegravir-based treatment strategies.

Here we report the ultra-deep sequencing detection of the combination of R263K with the M184V reverse transcriptase mutation associated with resistance against lamivudine/emtricitabine in the proviral DNA of PBMCs from two patients who successfully initiated dolutegravir-based therapy during primo-infection. The two mutations did not lead to virological failure.

The absence of virological failure in these two cases is in agreement with a previous study that showed that individuals with historic M184I/V mutations could be successfully treated with a 2-drug dolutegravir plus lamivudine treatment regimen. In another study however, the combination of R263K and M184V was associated with a case of virological failure under dolutegravir plus lamivudine as initial treatment.

Given recent interest in 2-drug dolutegravir-based drug regimens, a better understanding of the risks of multidrug resistance against RT and IN inhibitors is imperative. Our study provides information in this regard and calls for further investigation on the role of R263K in virological success or failure in HIV-positive individuals treated with dolutegravir.

BSP1.05

Predicting in vitro Resistance Phenotypes for HIV Protease and Integrase Inhibitors Using Sequences from Treated and Non-treated Individuals

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Background: A strategy for inferring the in vitro resistance phenotype was developed for HIV protease and integrase inhibitors based solely upon the population prevalence of mutations from previously treated and non-treated individuals.

Methods: The Stanford HIV database was used to retrieve subtype B HIV protease (n=57,138) and integrase (n=6,738) sequences along with their corresponding treatment information. Prevalence ratios were calculated for each position from treated (~16,453/ ~1,007) and non-treated (~ 42,177/~ 5,235) individuals. The logged sum of these ratios was used as a 'resistance score' for each individual and, for each drug available, was compared with PhenoSense and Antivirogram. The ability of the resistance score to predict drug susceptibility was measured with receiver operating characteristic (ROC) and precision-recall (PR) curves using manufacturer-specific PhenoSense IC_{50} thresholds for decreased susceptibility.

The capacity of the resistance score to function as a genotypic algorithm was then assessed using an independent dataset composed of protease (33,600) and integrase (3,298) sequences from HIV infected individuals in British Columbia. Using the prevalence ratios generated from the phenotypic dataset, the resistance scores were compared with two genotypic resistance algorithms (Virco for protease and the Stanford HIVdb algorithm for integrase).

Results: For each drug, the correlation coefficients between the PhenoSense/Antivirogram IC_{50} values and the resistance score ranged from 0.47-0.84 (PhenoSense average: 0.66, Antivirogram average: 0.69). Separating the data into a training (75%) and validation (25%) dataset, a threshold generated from ROC curves (area under the curve 0.94) yielded a sensitivity of 0.95 and a specificity of 0.85 for classification. For the genotypic dataset, a strong correlation was also observed where sensitivities and specificities for protease inhibitors were ~0.95/~0.90 and ~0.95/~0.7 for integrase inhibitors, respectively.

Conclusions: These results suggest that mutation prevalence ratios from prior treatment data can be used to predict phenotypes without any other phenotypic data.

BSP1.06

Oxytocin Enhances Pro-iInflammatory Cytokine Responses in Cervico-vaginal Epithelial Cells

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Introduction: Oxytocin, a neural hormone, is released during sexual activity. It was shown to dampen LPS-driven inflammation in gut epithelial cells, and to promote wound healing in mice. This study examined how oxytocin may impact female reproductive health by modulating immunity at the female genital tract. Inflammation increases susceptibility to infections. We hypothesized that oxytocin-treated epithelial cells would secrete immune mediators to promote a less inflammatory environment and a stronger barrier function, perhaps by accelerating wound healing and, thus, contributing to reduced susceptibility to sexually transmitted infections such as HIV.

Methods: Epithelial cell lines, Vk2 (vaginal), Ect1 (ectocervical), and End1 (endocervical) were treated with oxytocin in log10 doses (10 – 10 000 pg/mL) with or without stimulation (Poly(I:C)/LyoVec or LPS). Effects of oxytocin on RNA transcripts and secreted cytokines were assessed using RT-PCR and Milliplex assays, respectively. Oxytocin's effect on wound healing was assessed using scratch assays on epithelial monolayers (oxytocin, 10 000 pg/mL).

Results: Influences of oxytocin alone were specific to the origin of epithelial cells and dosage-dependent. Oxytocin treatment resulted in modest increases in pro-inflammatory cytokine transcription in Vk2 cells. In Ect1 cells, while a low dosage promoted expression of pro-inflammatory genes, high dosages (e.g. 1000 – 10 000 pg/mL) of oxytocin reduced pro-inflammatory gene expression. In End1 cells oxytocin reduced pro-inflammatory gene transcription regardless of concentration. As an immune-modulator oxytocin was found to enhance the pro-inflammatory cytokine responses to Poly(I:C)/LyoVec or LPS in all 3 cervico-vaginal cell lines. When tested for its role in wound-healing using scratch assays our preliminary data suggested that oxytocin had no effect.

Significance: These observations suggest that increased oxytocin at the endocervix, an important HIV transmission site could reduce female susceptibility to HIV infection and enhance anti-viral responses against HIV at the vaginal site. Further work in testing these hypotheses is warranted.

BSP1.07

Extensive Cross-Resistance to New and Existing Integrase Inhibitors Conferred by Accumulation of Multiple Mutations in vivo

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Background: Descriptions of clinically relevant resistance to the newest HIV integrase inhibitors are still relatively limited. In the VIKING study, dolutegravir response *in vivo* was reduced in those with Q148H±G140S and/or additional mutations. Here, we compare the phenotypic susceptibility from a panel of twelve patient-derived isolates with these mutations to all five available HIV integrase inhibitors.

Method: Recombinant viruses were produced by bulk and single copy PCR amplification, followed by co-transfection of integrase amplicons and linearized integrase-deleted pNL4.3 plasmid into a reporter T-cell line, CEM-GXR. Subsequent titering and phenotyping were performed in MT4-LTR-EGFP cell line using a Spectramax i3 Minimax 300 Imaging cytometer. Recombinant viruses were plated with a range of concentrations of raltegravir (RAL), elvitegravir (EVG), dolutegravir, (DTG), bictegravir (BIC) and cabotegravir (CAB). EC50s fold-changes (FC) relative to a NL4.3 control were determined on day 3 post-infection.

Results: Viruses with the combination of G140S and Q148H substitutions alone had >100 FC in EC50 for RAL and EVG, but relatively low changes (2-4-fold) in DTG, BIC or CAB susceptibility (Table 1). Viruses with additional mutations showed extensive cross resistance; those which also had L74M and T97A substitutions had higher FC (>50 to >100). Phenotypic resistance values were strongly correlated between DTG, BIC and CAB with correlation coefficients ranging from 0.91 to 0.98.

Table 1. Medium (IQR) Fold Change in EC50 of recombinant viruses with G140S and Q148H substitutions and additional mutations for RAL, EVG, DTG, BIC and CAB.

Median Fold Change in EC50 (IQR)			
Mutations (Stanford db)	G140S + Q148H	G140S + Q148H	G140S + Q148
		+T97A	+T97A +L74M
N (individuals)	6	3	3
n (viruses)	7	3	4
RAL	>100 (47 - >100)	>50 (>50 - >50)	>50 (>50 - >50)
EVG	>100 (>100 - >100)	>100 (>100 - >100)	>100 (>100 - >100)
DTG	3.5 (2.7-8.5)	33 (16-54)	417 (345-563)
BIC	2.7 (2.1-3.1)	11 (7.0-15)	67 (65-81)
CAB	3.7 (23.2-4.5)	80 (55-111)	456 (279-522)

Conclusion: Accumulation of multiple HIV mutations in HIV integrase lead to high level phenotypic resistance to all available HIV integrase inhibitors in patient-derived samples. Phenotypic resistance values for DTG, BIC and CAB were almost co-linear.

Biomarkers and Diagnostics

Biomarqueurs et diagnostics

BSP2.01

The Impact of Middle Eastern Origin, HIV and HCV in the Development of Hypovitaminosis D in Adults

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Background: Although a relationship between the development of vitamin D deficiency and HIV/HCV has been established in scientific literature, studies comparing the impact of HIV/HCV against other risk factors such as ethnic origin have not discussed.

Objectives: The goals of this retrospective observational study were: 1) to document vitamin D levels in groups of individuals at high risk of developing its deficiency, 2) analyze the data collected to numerically determine which group had the lowest average vitamin D levels, and to 3) discuss the impact of the findings and offer possible explanations.

Methods: This was a retrospective observational study which reviewed the medical charts of 266 non-institutionalized patients to document their most recent vitamin D levels at one infectious diseases site in Vancouver. Our subgroups were: A) individuals infected with HIV; B) individuals infected with HCV; C) individuals co-infected with HIV/HCV; D) people of middle eastern origin without HIV and/or HCV. The gathered data was subsequently statistically examined.

Results: More people of middle eastern origin were found were found to be vitamin D deficient when compared to those infected with HIV, HCV, or co-infected; 35.3% (average: 18.14mmol/l), 7.7% (average: 23.50mmol/l), 6.5% (average:18.33mmol/l) and 2.6% (average: 23mmol/l) were the proportions of those with deficiency in each category, respectively. Similarly, gender seems to play a greater role in those with HIV (0% females, 9.5% males) and HCV (0% females, 9.4% males; coinfected, 0% females, 3.2% males).

Conclusions: Our study uncovered that being of middle eastern origin was more significant than being infected with HIV, HCV, or co-infected in developing hypovitaminosis D. This suggests that genetic and environmental factors unique to otherwise healthy middle eastern people have a greater negative impact towards to development of hypovitaminosis D, when compared to being chronically infected with the HIV or HCV.

Eradication Strategies Towards an HIV Cure

Stratégies d'éradication, vers un remède contre le VIH

BSP3.01

Understanding iNKT Cell Function and Immune Restoration in HIV Infection

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Background: With anti-retroviral therapy (ART) implementation to treat HIV, the resulting pitfall to overcome is immune exhaustion, a loss of immune system effectiveness. Invariant Natural Killer T (iNKT) cells are innate lymphocytes bridging the innate and adaptive immune systems and are one of the first dominos to fall in the immune response. iNKT cells are critical combatants against viral infection; therefore, dysfunctional iNKT cells render the immune system less effective. For example, in HIV infection our lab has shown expression of lymphocyte-activation gene 3 (LAG-3), an inhibitory checkpoint marker, is increased on iNKT cells, correlating with decreased cell functionality. In order to characterize this dysfunction, stimulation conditions must be optimized by α-GalCer stimulation, a lipid antigen used commercially to stimulate iNKTs. To detect iNKT cells, they are fluorescently stained via an NIH tetramer, however the tetramer binds iNKT cells via an α-GalCer analogue, PBS-57, which may have secondary functions.

Hypothesis: We hypothesize that the iNKT tetramer will not only stain and identify iNKT cells, but also stimulate iNKTs via the PBS-57 α-GalCer analogue cell binding.

Approach: We will conduct iNKT cell stimulations and assess the cell populations' proliferation abilities and expression of both cytokines and inhibitory checkpoints, such as LAG-3, representing their exhaustion state and functionality.

Results: iNKT cells have been identified successfully by flow cytometry with a co-stain of 6B11 antibody and NIH CD1d Tetramer agreement over 97%. iNKT cells have been successfully activated with 50.3% IFNγ production after 10hr α-GalCer stimulation. iNKT cells have also been activated to 25.4% via the NIH Tetramer alone (10hr). The α-GalCer and Tetramer co-simulation resulted in a 61.6% stimulation.

Summary: The long-term goal of this project is to restore iNKT cell function, for example by implementing a LAG-3 inhibitory checkpoint blockade, restoring the overall strength of the immune system in HIV-positive individuals.

BSP3.02

Kinomic Changes Associated with LAG3 Stimulation

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Background: Persistent antigen stimulation of lymphocytes during HIV leads to impaired cytokine production and decreased cellular proliferation; this is known as immune 'exhaustion'. Exhausted cells express proteins, such as lymphocyte activation gene-3 (LAG3), that contribute to this dysfunctionality. When antigen is presented to a T cell, LAG3 binds to MHC class II on the antigen presenting cell and impairs T cell activation. However, the intracellular mechanism of LAG3-mediated impairment is almost completely unknown.

Objective: To clarify the effects of LAG3 blockade on human T cells.

Approach and Results: We stimulated normal human PBMC with the superantigen Staphylococcus enterotoxin B in the presence or absence of an antibody blockade of LAG3. We found that LAG3 blockade enhances T cell proliferation, in support of similar findings by other groups.

We also employed kinome analysis to evaluate the impact of LAG3 on T cell activation following bead-based cross-linking. Briefly, covalently-linked peptides, representing hundreds of kinase targets, on the surface of kinome arrays become phosphorylated by activated kinases from cell lysates. Here, we found that stimulation of T cells with CD3 and LAG3 antibody-coated beads reduced the phosphorylation of peptides associated with Akt, mTOR and PI3K signaling compared to similar stimulation with CD3 and a control antibody.

Future Directions: Use Jurkat cells overexpressing LAG3 to further elucidate LAG3's mechanism.

Significance: LAG3 inhibits the ability of T cells to respond to stimulation. Thus, blocking LAG3 may enhance HIV-specific immunity, while simultaneously helping to reactivate HIV from latently infected cells, on which LAG3 is upregulated. In this way, LAG3 blockade could encompass both arms of a "shock and kill" strategy. However, because the LAG3 mechanism is unknown, we do not know whether it impacts HIV latency. Identifying kinases and transcription factors impacted by LAG3 would help determine LAG-3's potential for immune enhancement or reactivating HIV latency.

BSP3.03

Reversal of HIV-1 Latency by Novel Sesterterpenoids Isolated from Phorbas Sponges

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Background: Testing the performance of novel compounds is a crucial element to expanding the HIV drug repertoire. Highly Active Antiretroviral Therapy (HAART) can suppress viral replication but does not act on latent viral reservoirs. "Shock and kill" therapeutic approaches aim to re-awaken viral expression in HIV reservoir-containing cells and target those cells for elimination. Thus Latency Reversal Agents (LRAs) that effectively stimulate virus production, when coupled with HAART to prevent new reservoir seeding, could potentially reduce viral persistence in HIV-positive persons.

Methods: We isolated a series of sesterterpenoid compounds from extracts of *Phorbas* sponges collected in Howe Sound, British Columbia. Compounds were tested for cytotoxicity and ability to induce HIV-1 expression using J-Lat cell lines which encode noninfectious, GFP-tagged proviruses. Potential mechanisms of latency reversal were ascertained by detecting synergism with LRAs of various functional classes and inhibition by pharmacological inhibitors of distinct signaling pathways. TNFα (a cytokine), panobinostat (an HDAC inhibitor), and prostratin (a PKC activator) were used as positive control LRAs.

Results: We identified multiple sesterterpenoids with potent latency reversal activity. Of particular note, the compounds Alotaketal A, Ansellone L, and Halkenone A induced dose-dependent GFP reporter expression which was 2.5- to 5-fold more potent compared to prostratin. Activities of multiple sesterterpenoids significantly synergized with those of TNFα and panobinostat but not prostratin. These activities were also antagonized by pan-PKC inhibitors like GÖ-6983, suggesting that sesterterpenoids fall within the PKC activator class of LRAs. Initial levels of toxicity in treated J-Lat cells were variable but resembled those of prostratin.

Conclusions: We identified a series of sesterterpenoids as novel LRAs that act, at least in part, through PKC activation. Detailed studies on toxicities, mechanisms of action, and effects in latently-infected primary cells are underway.

BSP3.04

Discovery of Novel Suppressors of HIV Transcription from African Natural Products

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Background: HIV-1 persisting within latent reservoirs is not targeted by licensed therapies and can reactivate at any time to produce infectious virus. Pro-latency agents (PLAs) that reinforce viral latency may promote long-term viral suppression that is refractory to subsequent reactivation, an approach termed "block-and-lock". Effective PLAs could theoretically lead to sustained drug-free HIV remission. However, current PLAs are few in number and not yet assessed in clinic.

Methods: We screened 433 compounds from marine natural products and African traditional medicines for their ability to inhibit HIV-1 replication using the CEM-GXR T cell line, which expresses GFP upon infection. Compounds that inhibited ≥ 50% GFP at < 5 µg/mL were assessed for ability to modulate HIV-1 reservoir expression in J-Lat 9.2 T cells containing a GFP-tagged proviral genome and in T cells isolated from HIV-positive donors.

Results: Two flavonoids ("KAM64", "BCA15") inhibited HIV-1 replication. These flavonoids also antagonized the activity of control latency reversal agents (e.g., PMA + ionomycin) in J-lat cells and/or primary T cells by > 50% at 5 µg/mL. Flavonoids are reported inhibitors of HIV-1 tat-mediated signalling. However, both also suppressed Gag-GFP expression from a doxycycline-induced, tat/TAR-deficient provirus, indicating additional mechanism(s) of action. Initial studies show that both flavonoids inhibit production of singly-spliced and unspliced but not multiply-spliced viral RNA, suggesting targeting of an early step of viral transcription.

Conclusion: We have identified flavonoids of African natural product origin which inhibit HIV-1 transcription from viral reservoirs and are potential leads for future "block-and-lock" –based therapeutic approaches.

HIV Latency and Viral Reservoirs

Latence du VIH et réservoirs viraux

BSP4.01

Potential Link Between Nef Immune Evasion Capacity and Clinical Parameters, But Not Reservoir Size, in Early HIV-1 Infection

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Background: Rapid within-host HIV-1 evolution and diversification, particularly among the gene encoding the viral accessory protein Nef that modulates key immune evasion functions, may influence viral pathogenesis and conceivably modulate reservoir size. However, the extent of within-host Nef genetic and functional diversity in early HIV infection, and their relationships with clinical and reservoir size measurements remain incompletely understood.

Methods: We isolated and cloned three plasma HIV-RNA-derived Nef sequences from 29 antiretroviral therapy naïve individuals within early (< 6-months) HIV-1 infection into a GFP-reporter expression plasmid. ; CD4 and HLA-I downregulation, two of Nef's main immune evasion functions, were functionally assessed by transfection into a HLA-A*02:01+ CEM-derived CD4+ T-cell line, following which cell-surface CD4 and HLA-A*02 downregulation was quantified by flow cytometry. Reservoir size measurements included total proviral DNA (copies per million CD4+ T-cells) and infectious units per million CD4+ T-cells (IUPM) measured by quantitative viral outgrowth assay.

Results: 24 (83%) participants harbored HIV-1 subtype B. Mean HLA downregulation capacity of all Nef clones was 71.7% relative to an SF2 reference Nef (range: 0-106.2, IQR: 62.0-90.7), while mean CD4 downregulation capacity was 92.3% (range: 5.4-104.5, IQR: 92.7-100.0). Within-host Nef genetic and functional diversity was substantial: within-host Nef clones differed by a mean 3.5 (range: 3.0-20.0, SD: 3.0) non-synonymous substitutions and exhibited mean standard deviations of 15.2% (range: 1.1-58.5, IQR: 3.1-21.6) for HLA downregulation and 7.5% (range: 0.3-55.7, IQR: 1.3-7.7) for CD4 downregulation. Maximal within-host HLA downregulation capacity correlated negatively with square-root-transformed CD4 counts (Pearson's R=0.35; p=0.07, n=29) and positively with $\log_{10}$pVL (Pearson's R=0.33; p=0.08, n=29). No significant relationships were observed between Nef functions and reservoir size (n=24).

Conclusion: Results support a link between Nef genetic/functional diversity in early infection and HIV clinical parameters, but not reservoir size, in this limited sample size. Further investigation in larger cohorts is warranted and ongoing.

BSP4.02

HIV Reservoir Size is Influenced by Inflammatory Cytokines but Not by Microbial Translocation

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Background: Immune activation and inflammation are influenced by gut microbiome translocation and in turn contribute to the maintenance of HIV reservoirs. Herein, we aim to determine the contribution of inflammatory cytokines and the composition of gut microbiome on HIV reservoir size.

Methods: Blood and fecal samples from 27 HIV+ Chinese subjects before and after ART were collected to quantify total HIV DNA and sequence the gut microbiome DNA. Plasma levels of Endocab, LBP, sCD14, sCD163 as well as 38 cytokines were measured.

Results: The majority of the patients were male (92.6%), with a median (IQR) age of 32 (30-39) years, CD4 T cell count of 336 ± 166 cells/μl. All of the patients were aviremic. After a median 15 months on ART, the median HIV DNA was 130 copies/million cells and was negatively correlated with both pre-ART CD4/CD8 (r=-0.40, P=0.038) and current CD4/CD8 ratio(r=-0.388, P=0.045). Current levels of IL-17A (r=-0.505, P=0.007), IFN-γ(r=-0.478, P=0.012), Eotaxin(r=-0.459, P=0.016), TGF-α (r= -0.408, P=0.0345), *MCP*-1 (r= -0.450, P=0.019) and VEGF (r=0.406, P= 0.036) were negatively correlated with the reservoir size. None of concentrations of the microbial translation markers including I-FABP, Endocab, LBP and sCD14 were associated with total HIV DNA. However, pre-ART sCD163 but not current sCD163 levels were positively associated with the HIV DNA copies (r=0.516, P=0.008). Alpha-diversity of the fecal microbiome was not associated with the amount of total HIV DNA (p=0.87 and 0.84 for Shannon index and Simpson index, respectively). Only presence of *Desulfovibrio* in gut (median 0.01% (IQR: 0-0.95%)) was positively correlated with total HIV DNA (r=0.39, P=0.045).

Conclusion: On short-term ART, HIV reservoir size is associated with inflammatory cytokines but not with markers of microbial translocation. Study findings favor a model by which HIV reservoir itself may directly contribute to systemic inflammation and has relevance for HIV cure strategy.

BSP4.03

A Phylogenetic Approach to Recover Integration Dates of Latent Human Immunodeficiency Virus Sequences Within-Host

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Background: The ability of HIV to establish latent viral reservoirs is the main barrier to cure. Thus, enhancing our understanding of within-host latent reservoir dynamics is crucial to HIV eradication. Towards this goal, we developed a phylogenetic framework to reconstruct integration dates of individual latent HIV lineages within-host.

Methods: The framework first involves inference, and optimal rooting, of a maximum-likelihood phylogeny relating longitudinal within-host plasma HIV RNA and putative latent sequences. Phylogenies were inferred with RAxML and optimally rooted via root-to-tip regression using the R package *ape*. A linear model relating the root-to-tip distances of plasma HIV RNA sequences to their sampling dates was used to predict the establishment (integration) dates of putative latent lineages from their root-to-tip distances.

Results: Model performance was first validated on simulated and published longitudinal HIV *env* sequences. The model was subsequently applied to single-genome-amplified HIV *nef* sequences sampled in-depth over a ~20 year timeframe (including ~10 years on suppressive cART) in two individuals with long-term viremia suppression. Results revealed a genetically heterogeneous reservoir that recapitulated HIV's within-host evolutionary history, where putative reservoir sequences interspersed throughout multiple within-host lineages with the oldest dating to >20 years prior to sampling. Notably, analysis of plasma HIV RNA sequences isolated from a viremia blip on suppressive cART revealed a genetically diverse viral pool spanning a 20-year age range, consistent with spontaneous within-host HIV reactivation from a large pool of latently-infected cells. Sensitivity analyses showed that linear models could be calibrated from as few as two time points and that model predictions were robust to rooting method.

Conclusion: Our method represents a novel and powerful tool in HIV persistence research that can shed important light onto HIV reservoir establishment dynamics and longevity. The heterogeneity and longevity of the HIV reservoir poses a challenge to immune-based HIV elimination strategies.

BSP4.04

HIV-1 Nef is Required for Robust Gag Protein Expression During Viral Reactivation

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Background: Nef is a crucial HIV accessory protein that modulates T cell signaling and may alter cell activation in the context of latency. To investigate Nef's role during latency reversal, we examined the reactivation efficiency of latent HIV$^+$ T cell lines harboring functional or defective Nef.

Methods: Latent CEM (CLat) T cell clones were generated using NL4.3ΔEnv viruses encoding Nef:GFP (WT_{SF2}, G2A) or Nef-IRES-GFP ($WT_{NL4.3}$, ΔNef). For selected clones, *nef* was disrupted using CRISPR/Cas9. Early (GFP) and late (Gag-p24) reactivation events were assessed 24h post-LRA treatment by flow cytometry. Proviral integration sites were identified using inverse PCR and DNA sequencing.

Results: We generated a panel of 49 CLat clones (Nef_{SF2}:GFP [N=11]; Nef_{G2A}:GFP [N=38]) with linked data on integration site and viral reactivation. Clones with identical integration sites were grouped for analysis. Following LRA treatment, we observed a lower efficiency of early (GFP) and late (Gag) reactivation events for CLat clones encoding defective Nef_{G2A}:GFP compared to those encoding WT Nef_{SF2}:GFP. Similarly, ΔNef-IRES-GFP clones did not produce Gag efficiently after LRA treatment. To confirm these observations, we disrupted the *nef* gene in four CLat clones encoding Nef_{SF2}:GFP or $Nef_{NL4.3}$-IRES-GFP. The percent and intensity of Gag expression was reduced in all bulk Nef_{KO} cell lines. We observed variable reactivation phenotypes in isolated Nef_{KO} clones that lacked the Nef-mediated ability to downregulate CD4 and HLA-A*02, but notably the efficiency of early (GFP) and late (Gag) reactivation events was lower in Nef_{KO} clones compared to their corresponding parental cell lines.

Conclusions: Our results highlight Nef's ability to modulate HIV reactivation from latency, including early and late protein expression in response to LRAs. Additional studies are necessary to assess the impact of natural *nef* sequence variation on this activity and to determine the clinical relevance of this observation.

Funded by CIHR (CanCure) and NIH-USA (BELIEVE Collaboratory)

BSP4.05

Targeted Latency Reversal of HIV-1 from Infected CD4+ T Cells

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The advent of curative therapeutics designed to eradicate HIV-1 is hindered by the virus' ability to establish latent pools of replication-competent provirus in resting CD4 T cells. While the 'shock-and-kill' strategy is a promising area of investigation, current latency reversal agents have been largely unable to induce viral gene transcription or impact the latent reservoir's size. Hence, there is a dire need for the development of novel strategies that induce HIV-1 proviral gene expression and eradication.

Using HIV-1$^+$ donor samples, we have developed antigenic virus-like particles for use as a novel latency-reversing activator vector (ACT-VEC). These ACT-VEC were previously shown to stimulate latency reversal in CD4$^+$ T cell from individuals treated at the acute stage of infection, and demonstrate that the major reservoir may reside in T cells with HIV-specific epitopes. Herein, we utilize a viral outgrowth assay for detection of replication-competent virus. ACT-VEC-pulsed DCs were either co-cultured or separated from autologous CD4 T cells using a semi-permeable membrane. In studies evaluating the replication competence of induced virus, MOLT4 cells were used to propagate the virus. MOLT4s were then transferred to a 48-well plate, and supernatants collected every 72 hours. qRT-PCR and p24 ELISA were used to detect the presence of infectious virus and protein production, respectively.

These results show that ACT-VEC pulsed MDDCs induced virus production in autologous, HIV-specific T cells. Released virus was capable of infection in MOLT4 culture and, over the duration of the study, p24 levels and viral RNA continue to increase until peaking at day 12. These levels were significantly higher (**p=0.005) than that of the 3, 6, or 9 day timepoints. We present evidence that ACT-VEC is a potent LRA capable of inducing the replication-competent viral reservoir in CD4$^+$ T cells, and may further facilitate cure.

BSP4.06

HIV-1 Reservoir Diversity in Testes and Matched PBMC of Individuals on Long-term ART

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Background: Characterization of HIV-1 reservoirs is a priority towards a cure. Previously, we revealed persistence of proviral DNA and limited drug penetration in testes of individuals on long-term ART. We characterize HIV diversity and compartmentalization between testes and PBMC from these individuals.

Methods: Matched PBMC and right/left testicular tissue samples were collected from 8 ART-treated adults with viremia suppression on ART for >6 months who underwent elective sex reassignment surgery. HIV proviral Nef sequences were obtained via single-genome amplification. Phylogenies were reconstructed by maximum-likelihood. HIV sequence compartmentalization between PBMC and testes was assessed using Wright's measure of population subdivision (F_{ST}) and Slatkin-Maddison (SM) tests.

Results: A total of 377 Nef sequences were isolated from PBMC (n=235) and testes (n=142). Within-host HIV diversity varied markedly: a single variant dominated the proviral landscape of some participants while in others the majority of sequences were unique. Median within-host patristic distance was 0.02 (0.008-0.05) substitutions/site. In the majority of participants in whom multiple identical sequences were detected, this sequence was present in PBMC and testes. While overall diversity between PBMC and testis compartments did not significantly differ (median within-host patristic distance 0.016 vs. 0.013; p=0.461), F_{ST} and SM tests nevertheless consistently identified significant genetic compartmentalization between testis and PBMC in 4/8 donors (F_{ST} scores=0.89, 0.67, 0.29, 0.27 and 0.22; all $p<0.05$; SM all $p<0.05$).

Conclusions: HIV proviruses in testes and PBMC display genetic compartmentalization in half of studied individuals. Our results are also consistent with migration of clonally-expanded latently HIV-infected cells throughout blood and testes. Eradication strategies will need to consider the presence of latently HIV-infected cells in the testes, that may in some cases exhibit substantial genetic diversity.

BSP4.07

P61: a Potential Novel HIV Latency Reversal Agent of African Natural Product Origin with a Distinct Mechanism of Action

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Background: HIV-1 persists in cellular resevoirs despite antiretroviral therapy which suppresses viremia to undetectable levels; this hinders cure. Pharmacological activation of latent provirus by Latency reversal agents (LRAs) in what is termed "Shock-and-kill" approach is one of the current intuitive strategies aimed at combating HIV-1. The current LRAs are not fully effective due to a variety of reasons that include excessive toxicity, poor efficacy and inconsistent viral reactivation hence the need for new LRA agents and combinations.

Methods: We screened 181 compounds from the pan-African Natural Products Library (pANAPL) and African traditional medicines using the J-Lat 9.2 GFP-reporter T cells containing an NL4.3Δenv/nef genome. We performed MTT assay to assess P61 for toxicities. We treated J-Lat cells with descending dosages of P61 and assessed it for viability and GFP expression after 24hrs. We investigated synergism with established LRAs, and activity in additional cell models.

Results: We identified an anthrone ("p61") which reactivated virus expression in 3 cell lines: 23.8%, 19.8% & 50.3% GFP at 15 µg/mL P61 in J-Lat 9.2, 8.4 & 10.6 respectively. P61 synergized with panobinostat, prostratin, and TNFα, suggesting a distinct mechanism of action. p61 does not synergize with the anti-malarial artemisinin, suggesting similar mecahnism of action. P61 is tolerated at concentrations that are comparable to prostratin, a control PKC activator. p61 kept at -80 is toxic to THP-1 cells.

Conclusion: We have identified a potential new LRA of African natural product origin with a distinct mechanism of action and are characterizing it.

BSP4.08

Modeling Lentiviral Infection and Viral Latency with Host Immune Responses in the Brain during Antiretroviral Therapy

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HIV-1 latency in viral reservoirs is a continuing challenge for the treatment of patients with HIV/AIDS. A mathematical model was created to describe and predict the viral dynamics and host immune responses of lentiviral infection within the brain during effective combination antiretroviral therapy (cART). The mathematical model was based on the biology of lentiviral infection of brain macrophages and host immune responses and used to describe the dynamics of transmission and progression of lentiviral infection within brain. The mathematical model predicts productively and latently infected brain macrophages and host immune responses from primary infection.

BSP4.09

Characterization of HIV-1 Integration Sites in the Presence or Absence of Nef

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Background: Latent viral reservoirs are a key barrier to development of curative strategies against HIV. The location of proviral DNA integration into the host cell chromosome affects HIV gene expression and establishment of latency. The HIV accessory protein Nef modulates T cell signaling, however it is unknown if Nef affects the establishment or maintenance of latency. Here, we characterized integration site and reactivation efficiency in a panel of T cell clones encoding functional and non-functional *nef* alleles.

Methods: Latently infected CEM (CLat) clones were established using NL4.3ΔEnv viruses encoding functional (Nef_{S-F2}GFP, Nef_{M20A}GFP and $Nef_{NL4.3}$-IRES-GFP) or non-functional (Nef_{G2A}GFP and ΔNef-IRES-GFP) Nef/GFP. Reactivation from latency was assessed using flow cytometry to measure GFP expression upon exposure to latency reversal agents (i.e. TNFα). Integration site was determined using inverse PCR amplification and sequencing with primers located in *gag*. Characteristics of the HIV integration site were determined using the BLAT genome analysis tool.

Results: 100 CLat clones were assessed and 26 unique integration sites were identified for detail characterization. Of these, 21 sites were observed in clones encoding a functional Nef (N=54). The majority (84.5%) of proviruses integrated into gene-encoding intronic regions and a higher proportion of integration events occurred in chromosomes 16 and 19, which are enriched in active genes. Proviruses encoding non-functional Nef integrated into genomic regions that were more transcriptionally active (p=0.04). Integration near DNase I hypersensitive regions (reflecting a more open chromatin structure) was associated with higher reactivation GFP expression in CLat clones encoding functional Nef (p=0.02). For all tested clones, distance from the integration site to the centromere correlated negatively with viral reactivation following TNFα treatment (p=0.01).

Conclusion: These results provide evidence that Nef contributes to the establishment of reactivation-competent HIV reservoirs, which may affect characteristics of the proviral integration site and sensitivity to LRAs.

Funded by: CIHR (CanCure)

BSP4.10

Impact of Latency-reversing Agents on Human Primary Macrophages Physiology and on Their Susceptibility to HIV-1

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Long term persistence of HIV-1 in infected individuals despite treatment is thought to result from the early establishment of a latent reservoir of infected cells. The "Shock and Kill" strategy has been proposed to stimulate reservoir cells via latency reversing agents (LRAs) while continuing antiretroviral therapy, which would lead to immune recognition and elimination of latently infected cells while limiting viral propagation. LRAs have been extensively studied in $CD4^+$ T cell populations but information is lacking regarding their impact on other HIV susceptible cells such as macrophages. Thus, we propose to study the effect of select LRAs (bryostatin-1, romidepsin, and JQ1) on macrophage physiology and susceptibility to HIV-1 infection.

Primary human monocyte-derived macrophages (MDMs) were exposed to optimal doses of LRAs for 24h. Secretion and gene expression of CCL2, CCL5, IL-8 and TNF were evaluated by ELISA, reporter cell line and qRT-PCR. Susceptibility to infection was assessed using a molecular clone of HIV-1 expressing a reporter gene (HSA) and detected by FACS, or via an ELISA detecting the viral capsid. Viability was determined by differential fluorescent dye incorporation using flow cytometry.

Treatment of MDMs with LRAs, and especially with bryostatin-1, for 24h is associated with a potent induction of CCL2, CCL5, IL-8 and TNF secretion of up to 2.5, 13, 97, and 128 fold respectively. Viability assays did not show negative effects of LRAs on MDMs. Treatment of MDMs with bryostatin-1 prior to infection was associated with a 90% decrease in infection.

Although LRA treatment was reported not to activate T cells *in vivo*, activation of other innate or effector cell populations such as macrophages could result in problematic complications. Hence it is of great importance to elucidate the effect of these poorly discriminating agents on the activation state of immune cells and their downstream effects on immune homeostasis.

HIV Virology (Viral and Host Factors)

Virologie du VIH (Facteurs liés au virus et à l'hôte)

BSP6.01

Incorporation of SERINC5 into HIV-1 Particles Sensitizes the Virus to the Inhibition by Neutralizing Antibodies and IFITM Proteins

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SERINC5 restricts HIV-1 infection by incorporating into virus particles and impairing viral infectivity. But HIV-1 encodes the Nef protein that downregulates SERINC5 from the cell surface and prevents the incorporation of SERINC5 into virus particles. We have shown that in addition to Nef, the Env proteins of some primary HIV-1 isolates including AD8-1 and YU-2 are able to resist ectopically expressed SERINC5, but without excluding SERINC5 from incorporation into virus particles. Testing a large panel of HIV-1 Env clones of different viral subtypes reveals that this SERINC5-resistance activity is quite conserved in the majority of HIV-1 Env. We have further investigated why, if the Env protein can confer resistance to SERINC5, HIV-1 has to evolve Nef to remove SERINC5 from virus particles. Our results showed that if SERINC5 got incorporated into HIV-1 particles, the virion–associated SERINC5 renders the virus more sensitive to the inhibition by CCR5 inhibitor maraviroc. More interestingly, some broadly neutralizing antibodies 4E10 and 35O22 inhibited the SERINC5-bearing HIV-1 to a greater extent. We also observed that if SERINC5 was allowed into HIV-1 particles, the virus became more vulnerable to the inhibition by IFITM3. Lastly, we have found that SERINC5 in the virus producing cells, if not removed, diminished HIV-1 cell-to-cell transmission. Together, these data suggest that HIV-1 needs Nef to block the incorporation of SERINC5 into virions so that virus particles are able to better resist host inhibitory mechanisms and more efficiently transmit between cells.

BSP6.02

ADAR1, an Interferon Stimulated Gene and RNA-editing Enzyme, Contributes to Low Innate Immunity Against HIV-1

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Background: Interferon (IFN)-stimulated genes (ISGs) are produced following HIV-1 infection and limit viral replication, but viral and cellular proteins counteract their effect. The adenosine deaminase (ADAR1) is an ISG and is present in three forms in the cell. The p150 form is IFN-inducible while the p110 and p80 forms are constitutive. ADAR1 p150 expression is increased during HIV-1 replication in lymphocytes, but its activity promotes HIV-1 replication. The IFN-induced protein kinase RNA-activated (PKR) acts as a potent HIV-1 inhibitor by the phosphorylation of the translation initiation factor eIF2α. PKR is activated at the beginning of HIV-1 infection and is deactivated when the virus replicates.

Aim: Our aim is to determine the status of PKR activation and ADAR1 expression in patient cells and to elucidate how ADAR1 contributes to the low innate immunity in HIV-replicating cells.

Results: We compared the activation of PKR and the expression of ADAR1 in uninfected subjects, HIV-infected naïve patients and HIV-infected treated patients by western blots. We observed an inverse correlation between PKR activation and ADAR1 expression in HIV-infected patients. We found that ADAR1 counteracts PKR activation. We performed immunoprecipitations (IPs) to determine the complex formation around PKR and identified a multiprotein complex with ADAR1, TRBP, PACT and the viral Tat proteins. We inhibited ADAR1 expression using shRNAs in adherent cells and found a decreased HIV-1 production. We specifically prevented the expression of ADAR1 p150 by CRISPR-Cas9 method in the lymphocytic Jurkat cells and we are analyzing HIV-1 replication and the IFN response in these cells.

Conclusions: The strong PKR inhibition during HIV-1 replication can be explained by the formation of a multiprotein complex with ADAR1, TRBP, PACT and Tat proteins. ADAR1 has a proviral effect and its induction during HIV-1 replication may contribute to viral persistence by decreasing the natural innate immunity against HIV.

BSP6.03

HIV-1 Nef Function Requires Compatibility Between the N-terminal Arm and the Proline-rich Motif of the Core Domain

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Background: HIV-1 Nef modulates TCR signaling and downregulates cell surface proteins CD4, HLA-I and SERINC5. Nef encodes a flexible N-terminal arm and a folded core domain that may exist in "closed" and "open" conformations; however, the impact of interactions between the arm and core on Nef function is not fully understood. To investigate this, we examined chimeric proteins created using two common lab-adapted Nef isolates, SF2 and NL4.3, which display WT activity.

Methods: Nef mutants were generated by overlap extension PCR. Downregulation of CD4, HLA-I or SERINC5 was assessed by transfection of Nef and SERINC5-(iHA) into CEM-A*02 T cells. TCR signaling inhibition was assessed following CD3 stimulation of Jurkat cells transfected with Nef and an NFAT-driven luciferase plasmid. Bimolecular fluorescence complementation (BiFC) and intracellular Nef expression was assessed by flow cytometry.

Results: A Nef chimera containing the SF2 N-terminal arm (residues 1-57) and NL4.3 core (residues 58-206) was impaired for TCR signaling inhibition, HLA-I and SERINC5 downregulation, yet remained functional for CD4 downregulation. A T71R substitution in the $P_{69}xxP_{72}$ motif of the $SF2_{arm}NL4.3_{core}$ chimera restored most function and also increased interaction with cellular Hck. Furthermore, differential detection of WT SF2, $SF2_{arm}NL4.3_{core}T_{71}$ and R_{71} was observed by flow cytometry using monoclonal antibody 3D12 (median fluorescence intensities [MFI] of 165, 85 and 150, respectively), suggesting increased exposure of this N-terminal Nef epitope (residues 35-50) in the presence of R_{71}; while Western blots with this antibody showed comparable steady-state protein expression.

Conclusions: Our results highlight the importance of sequence compatibility between Nef's N-terminal arm and core domain for many critical Nef functions. This could be attributed to impaired transition between closed and more open Nef conformations that lead to greater exposure of the N-terminal arm and the proline-rich motif.

BSP6.04

A Selective Role for eIF4AIII and UAP56 in Mediating HIV-1 Gag Expression

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To develop novel strategies to inhibit HIV-1 replication, we examined the role of host factors in regulating viral RNA processing and utilization. While most host mRNAs

use NXF1 for export to the cytoplasm, HIV-1 unspliced (US) and singly-spliced (SS) RNAs require Rev mediated export by CRM1 to synthesize Gag and Env, respectively. To understand what advantage might be conferred by the CRM1 export pathway, we performed shRNA knockdowns (KDs) of ribonucleoprotein (RNP) components involved in RNA export and translation for their effects on HIV-1 Gag and Env synthesis. Here, we report on our analyses of five factors, eIF4AIII, SKAR, UAP56, URH49 and Aly/REF, involved in export and translation of host mRNAs. While depletion of any of these factors had minimal effect on HIV-1 Env synthesis, depletion of UAP56 resulted in a small reduction of Gag expression without affecting HIV-1 RNA abundance or total protein synthesis. Parallel assays indicated that decreased UAP56 levels had no impact on nucleocytoplasmic transport, whereas subsequent RNA Fluorescence In Situ Hybridization (RNA-FISH) studies of US RNA suggest a role for UAP56 in cytoplasmic localization of viral transcripts. KD of eIF4AIII resulted in greater reduction in Gag expression despite significant increases in US HIV-1 RNA abundance and total protein synthesis. Preliminary RNA Immunoprecipitation (RIP) assays using a-eIF4AIII antibodies suggest an association between eIF4AIII and HIV-1 mRNA in the nuclear compartment and the role of eIF4AIII in nucleocytoplasmic localization of viral RNA is currently being investigated. Further exploration of individual host factors and their contribution to HIV-1 gene expression could provide insights that would facilitate the development of novel therapies to control this infection.

BSP6.05

The Mucosal Lectin Trap Selects for Reduced Glycosylation of the HIV Envelope

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In the diverse viral pool at the site of HIV transmission, a single variant penetrates the tissue and establishes infection—termed the Transmitted/Founder (T/F) virus.

Our preliminary data in penile and cervical tissues reveal *ex vivo* transmission fitness of a virus differs from its pathogenic fitness. The pathogenicity of a virus lies in its ability to persist over time following transmission, whereas transmission fitness is the ability of a virus to penetrate the mucosal tissue, be taken up by migratory DC's, and trans-infect its target T cell. Recipient mucosae contain several barriers which select for specific properties in the T/F virus. A major bottleneck arises in the mucosa where host lectins function as a "trap" by binding the glycosylated HIV envelope prior to tissue penetration. To support this bottleneck, we show that T/F viruses lack certain glycosylation sites. We propose that the difference in glycosylation of acute vs chronic infection is due to lectin binding of gp120, whereby higher transmisson fitness corelates with decreased lectin binding while chronic viruses increase their pathogenic fitness by acquiring glycans to evade the immune system.

Using mass spectrometry, we will characterize the glycosylation of our acute T/F viruses and compare them to our chronic viruses. We will then modify the glycans and compare transmission fitness of several viruses simultaneously in penile, cervical, and rectal tissue using our *ex vivo* tissue explant model. Optimized by Drs. Arts and Klein at UWO, this model allows us to measure transmission fitness in the main receptive tissues, mimicking the *in vivo* transmission event.

Elucidating the selected properties during a bottleneck provides the specificity required for vaccines and preventative therapies. >76% of male-to-female transmission events result from a single T/F variant with reduced glycosylation. Being able to target this variant in a pool of thousands is invaluable for future treatments.

BSP6.06

Barrier to Autointegration Factor 1 (BAF1) potentiates the antiretroviral effect of APOBEC3 restriction factors

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The evolutionary arms race between the immune system and pathogens has prompted the emergence of several host restriction factors, including the family of APOBEC3 (A3) cytidine deaminases. These proteins restrict the retroviral lifecycle, most notably HIV, by mutagenically altering the viral genome along with directly inhibiting reverse transcription and integration. Conversely, the literature suggests that HIV exploits the host nuclear protein, barrier-to-autointegration factor (BAF), and its binding partners to locate sequences in the host genome for integration. Interestingly, BAF has no significant impact on non-productive autointegration of viral genome in HIV, which seems to be its main role in simpler retroviruses. In this study we asked whether HIV restriction by A3 is related to the role and levels of BAF. This is the first study to investigate the function of BAF in both target and virus producing cells. Over-expressed BAF in viral producer cells significantly diminishes viral infectivity only when A3 is co-expressed. This function is independent of an intact active site in the A3 proteins tested, implying that BAF is involved in the deamination-independent mode of A3 restriction. This study further explores the role of BAF during HIV infection, while focusing on a previously unidentified relationship between A3 and BAF. Our data indicates that BAF1 may constitute a novel auxiliary restriction factor for HIV.

BSP6.07

Exploring Novel Mechanisms of HIV-1 Rev-dependent RNA Translation: Synthesis of Gag in the Presence of Translational Inhibitors

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HIV-1 protein expression is dependent upon tight regulation of RNA processing, which is not controlled by cART and contributes to virus-related morbidity. Recent studies have determined that Rev-dependent nuclear export of HIV-1 RNA via the CRM1 pathway results in an altered pattern of subcellular distribution and utilization, and is stringently required throughout changing intracellular conditions during infection. To explore how an alternate export pathway may impact the engagement of viral RNA with the host translation apparatus we examined structural protein expression from an integrated provirus under the influence of various translation inhibitors using SUnSET. First, immunoprecipitation analysis indicated the enrichment of Rev-dependent RNA with eIF4E, despite studies implicating retention of the nuclear cap-binding complex to confer selective translation of Rev-dependent transcripts. To validate this observed 4E dependence we inhibited translation in U2OS HIV-1 GagGFP RevGR late-phase model cells with the mTORC1 inhibitor Rapamycin resulting in reduced GagGFP expression, but with stronger inhibition using mTORC1/2 inhibitor Torin1. Interestingly, inhibition of the 4E-4G interaction by 4EGI-1 failed to reduce GagGFP expression yet was reduced by 4E1RCat which additionally inhibits the 4E-4EBP1 interaction, suggesting a 4E-dependent mechanism independent of eIF4G1. Inhibition of the third eIF4F component, eIF4A, by Hippuristanol or Silvestrol completely ablated both viral and global translation indicating a critical requirement for this helicase and its activation by eIF4G1. Inhibition of RNA helicase A by YK-4279 displayed no effect on GagGFP expression. Surprisingly, prolonged exposure to eIF4A inhibitors revealed robust expression of GagGFP despite the cells remaining in a cytostatic state suggesting 4A-independence under conditions of stress, a phenomenon currently under investigation. Currently we propose that Rev-dependent transcripts appear to utilize a 4F-independent translation pathway yet co-opt these components in a non-canonical manner that is contingent on their availability under changing physiological conditions.

BSP6.08

Fcgbp Within the Cervicovaginal Mucosa Traps HIV-1 to Inhibit Sexual Transmission

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It is accepted that there is some factor in the cervicovaginal mucosa that inhibits sexual transmission of HIV-1. Indeed, the natural barrier is recognized as being fairly efficient because most sexually transmitted infections are caused by a single virion. Understanding the mechanism responsible for this bottleneck could provide new strategies to curb the continuing epidemic. We propose that fcgbp (the fc of IgG binding protein) is the factor within the mucosa which is able to trap HIV-1 via its V1V2 loop of the gp120 viral envelope. Development of a microbicide to increase mucosal fcgbp protein expression could enhance the natural barrier to prevent sexual transmission of HIV-1.

BSP6.09

Differences in Vpu Function Among Major HIV-1 Group M Subtypes

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Background: Vpu-mediated downregulation of CD4 and tetherin from the HIV-infected cell surface evades host immunity and promotes viral egress; however, little is known about the functional diversity of Vpu among HIV-1 subtypes.

Methods: Plasma samples were collected from chronic ART-naive HIV-infected individuals from Uganda and Canada. HIV RNA was extracted and Vpu sequences amplified by nested RT-PCR. Amplicons were cloned into an expression vector that features separate promotors driving Vpu and GFP. Clones were functionally assessed by flow cytometry for their abilities to downregulate CD4 and tetherin following transfection into an immortalized CD4+ CEM T-cell line. Each Vpu activity was normalized to that of negative (empty vector) and positive (Vpu NL4-3) controls. Vpu sequence polymorphisms associated with in vitro function were identified.

Results: A genetically diverse panel of 238 Vpu sequences was cloned and phylogenetically authenticated. Clones represented four major group M subtypes (A [n=48], B [89], C [18] and D [72]) as well as 1 H and 10 CRFs. The in vitro function of 212 clones was assessed. Normalized downregulation activity (median [IQR]) was 1.04 [0.95-1.17] for CD4 and 0.92 [0.86-0.96] for tetherin. Significant differences were observed between subtypes for downregulation of CD4 ($p=0.005$, Kruskal-Wallis) but not tetherin ($p=0.2$). Multiple Vpu amino acids were associated with Vpu function ($p<0.05$), which differed between subtypes.

Conclusions: Our results highlight the extent to which global HIV-1 sequence diversity may impact critical Vpu functions. Analysis of polymorphisms associated with Vpu function may identify novel motifs associated with natural

variation in protein activity that contribute to differences in viral pathogenesis among HIV subtypes.

Host Genetics and Viral Evolution

Génétique de l'hôte et évolution virale

BSP7.01

Modeling Two Distinct Evolutionary Forces on HIV-1 at the Within- and Between-host Levels

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HIV-1 is a rapidly evolving virus that faces two major selective challenges: competition for susceptible cells within a host and a severe bottleneck upon transmission between hosts, through which the majority of new infections descend from a single transmitted variant. This founder variant tends to resemble early variants in the source infection; *i.e.,* the virus 'forgets' its evolution in the previous host upon transmission to the next host. We develop a mathematical model to examine the evolution of HIV-1 transmission fitness that allows these two selective pressures to be decoupled by the archiving and reactivation of HIV-1 from the latent viral reservoir.

We use a compartmental model (system of differential equations) to represent within-host evolution and dynamics, in which an infection is initialized with a single infected cell. We assume the virus genotypes mutate irreversibly with progressively greater infectivity (β) that determines their relative fitness within the host. Further, we assume infected cells transition into and out of a genotype-specific virus latent reservoir with proliferation at constant rates. Lastly, we decouple transmission fitness (φ) from the within-host β evolution with the assumption that φ evolves independently of β as a stochastic process within a host with increasing variation over time. We implemented our simulation in *Mathematica* solving the within-host model using *NDSolve*.

Our model predicts that the archival of the founder variant in a persistent latent reservoir plays a significant role in the preferential transmission of virus with greater transmission fitness. Competitive growth within hosts increases the relative proportions of virus genotypes with greater infectivity and decreases the proportion of founder virus available for transmission, requiring a larger latent reservoir or stronger φ effect to reach a quasi-steady-state in the epidemic. Together with empirical evidence of a small latent viral reservoir, this implies rapid decay of transmission fitness within hosts.

BSP7.02

Investigation of HIV Transmission Dynamics Among Young Women Engaged in Sex Work in Mombasa, Kenya

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Background: Targeted intervention programs covering female sex workers (FSW) have unique challenges as some women that engage in formal sex work may not identify themselves as FSW or that young women transitioning into formal sex work may not have access to these programs. Characterising the sexual life course of young women as they transition into formal sex work and estimating the time of HIV infection may be important in understanding the risks of acquiring HIV during the transition period.

Methods: In 2015, 1,206 young women from Mombasa, Kenya, between the ages of 13 to 25 were tested for HIV from dried blood spots.Approximately 6 percent (n = 67) were found to be seropositive and of those, 66% (n = 44) were successfully sequenced for HIV-1 pol gene. Haplotypes of the viral quasispecies were reconstructed using aBayesQR. HIV subtyping was done using REGAv3. Intra-host sequence diversity was used to infer the duration of HIV infection. Transmission networks were reconstructed using PHYLOSCANNER.

Results: Of the young women successfully sequenced for HIV-1 pol (n =44), the mean age at time of HIV infection was 15.9 years old. Reconstruction of transmission networks revealed minimal clustering (18%), as expected in a population where heterosexual contact is the primary risk for HIV acquisition. One cluster of 4 women showed virus subtype heterogeneity: two individuals with pure subtype C, one with A1/C recombinant and another with C/G recombinant, suggesting viral introductions from different clients into this network.

Conclusion: In this study, we used various bioinformatics tools to understand the transmission dynamics among young women transitioning to and engaging in formal sex work. Identifying HIV risks during the transition period may help in evaluating the benefits of expanding targeted intervention programs to include those that do not self-identify as FSW.

BSP7.03

Long-term Functional Evolution of HIV Nef Protein Within-Host

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Background: HIV-1 Nef is among the most rapidly evolving viral proteins and a major target of cellular immune responses. Nef also mediates immune evasion functions including cell-surface CD4 and HLA-I downregulation. However, the impact of within-host Nef evolution on its key protein functions remains incompletely understood. We assess within-host Nef genetic and functional evolution over a >10-year period within an HIV-infected individual naïve to cART.

Methods: Using SGA, we isolated 43 unique plasma HIV RNA Nef sequences at 12 timepoints spanning an 11-year period in a cART-naive HIV-infected individual. Nef sequences were cloned into the pSELECT-GFP expression vector and sequence-validated; N=5 clones with ≥1 nonsynonymous mutation(s) from the original sequence were excluded. Nef clones were transfected into an immortalized CD4+ T cell line expressing HLA-A*02. The ability of each Nef clone to downregulate cell-surface CD4 and HLA-A*02 was assessed using flow cytometry, and results normalized to the activity of the SF2 Nef strain.

Results: The 38 within-host Nef clones (median 3 clones/timepoint) displayed amino acid variation at 33 of 207 (15.9%) sites, while the within-host Nef phylogeny exhibited mean tip-to-tip distance of $4.3e^{-2}$ (nucleotide substitutions/site) and a tree height of $4.3e^{-2}$. Overall, within-host Nef clones displayed a relatively narrow range of CD4 downregulation function (median 100% [IQR: 97-102%] relative to SF2) and a wider dynamic range of HLA downregulation function (median 87% [IQR: 69-96%] relative to SF2). Notably, Nef-mediated HLA downregulation decreased with time since infection (R^2=0.1; p=0.038; 2.4% functional decrease/year). Nef-mediated CD4 downregulation activity exhibited a similar trend (R^2=0.09; p=0.076; 0.74% functional decrease/year).

Conclusions: Subtle progressive declines in both of Nef's major functions during long-term untreated HIV infection raise the intriguing question of whether these alterations reflect direct fitness consequences of within-host HIV evolution or whether the requirement for maintaining these functions lessens with progressive immunodeficiency.

Immunology of HIV and Vaccines

Immunologie du VIH et vaccins

BSP8.01

The Role of Soluble IL-7 Receptor α (sCD127) in Mediating T-cell Homeostasis in vivo

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Introduction: Interleukin-7 is an essential cytokine that plays a major role in the development and homeostatic maintenance of T-cells. The presence of soluble forms of various cytokine receptors have been proposed to be involved in the endogenous regulation of cytokine activity. Due to the natural ability of the soluble IL-7 receptor (sCD127) to bind to IL-7, there is an interest in its potential application as an immunotherapeutic agent in diseases where IL-7 has been found to be relevant, including HIV infection.

Hypothesis: Soluble CD127 will enhance T-cell proliferation by increasing the bioavailability of IL-7.

Methods: Using an *in vivo* T-cell depletion model, wild type C57BL/6 mice were injected intra-peritoneally with anti-CD4 and anti-CD8 depleting antibodies. The pattern of T-cell reconstitution in mice receiving exogenous sCD127, IL-7 or the combination was investigated. Peripheral blood mononuclear cells (PBMC) were isolated, and stained to characterize T-cell proliferation by flow cytometry, and surface CD127 expression on T-cells. In addition, plasma was collected for measurement of sCD127 and IL-7 by cytometric bead array.

Results: Following complete T cell depletion, $CD4^+$ T-cell reconstitution was almost complete 6 weeks following T-cell depletion, while $CD8^+$ T-cells were only partially reconstituted at this time point. Two weekly doses of sCD127, IL-7 or the combination had no significant effect on the overall distribution of T-cells in blood. Preliminary data suggests that daily, rather than weekly dosing of sCD127 and IL-7 may be necessary to observe any effect.

Conclusion: Antibody-mediated T-cell depletion is a potentially valuable tool to investigate lymphopenia-induced proliferation and potential therapies thereof. Dosing of sCD127 and IL-7 will first need to be optimized before determining their role in this process. This may then provide important insights for understanding the potential therapeutic use of sCD127 and its impact on IL-7 function.

BSP8.02

Sustained Virologic Suppression Differentially Influences HIV-Specific Cell-mediated Immune Responses in Perinatally Infected Children and Adolescents

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Background: Cell-mediated immunity (CMI) is a key component in host responses to HIV infection in adults and children. We examined the relationship between Gag-specific T-cell responses and duration of sustained viral suppression (SVS) in a group of HIV-infected children and adolescents with perinatally acquired HIV infection.

Methods: Peripheral blood mononuclear cells (PBMC) obtained from HIV-infected children and adolescents (n=79) were used in ELISpot assays to measure IFN-g production in response to stimulation with clade-matched HIV-1 Gag peptide pools. ELISpot positivity was defined according to standard criteria (>50 spot-forming units [SFU] per 10^6 cells and 2 SD over negative controls). The magnitude (cumulative, mean, and median SFU per 10^6 cells) and breadth (proportion of pools inducing IFN-g production) were compared with age and duration of SVS.

Results: A statistically significant association was observed between age (median=13.9 years, IQR= 1.3–19.8 years) and magnitude of the IFN-g response (cumulative: p=0.0211; mean: p=0.0233; median: p=0.0167; Spearman test) and between age and breadth of antigenic recognition (p=0.0106). When only children (<13 years; n=33) were taken into account, this association was more significant (cumulative: p=0.0003; mean: p=0.0003; median: p=0.0011; breadth: p=0.0005). Conversely, for adolescents (≥13 years; n=46), statistical significance was lost. Cumulative proportion of life under SVS and proportion of the last period under SVS were also negatively correlated with the magnitude of IFN-g responses (p=0.0021 and p=0.0002, respectively). Associations observed in children were stronger than those observed in adolescents, for whom only the last period under SVS was correlated with IFN-g responses.

Conclusion: The positive correlation between age and HIV-specific T-cell responses suggest progressive evolution in magnitude and breadth of antigenic recognition with age in HIV-infected children. The proportion of life with SVS, likely reflective of reduced exposure to HIV antigens, emerged as a negative predictor of HIV-specific CMI.

BSP8.03

A Nano-Vaccine Targeting Three SIV Protease Cleavage Sites Induces Robust Antigen-Specific Cellular Immune Responses in Nonhuman Primates

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Background: We are conducting a pre-clinical study with cynomolgus macaque/SIV model to test the efficacy of a vaccine targeting HIV maturation by focusing immune responses to the protease cleavage sites (PCS).

Objective: Evaluate recall cellular immune responses induced by novel nanoparticle formulations carrying PCS peptides in Cynomolgus macaques

Methods: Three 20-amino acid peptide overlapping SIVmac239 PCS2, 5 and 12 were packaged in 2 different formulations of chitosan, dextran sulfate and hyaluronic acid (NANOpcs). Eight female *Cynomolgus* monkeys were immunized and boosted with NANOpcs. Heparinized blood was collected before and after immunization and boosts. PBMCs were stimulated with pools of PCS, Gag (containing PCS sequences), or Env peptides. Supernatants were collected during IFN-γ ELISPOT assay and analyzed with a customized 14-plex protein assay using a Bio-Plex 200 system.

Results: Immunization and boost with the NANO packaged PCS peptides induced cellular responses to SIV antigens. This is shown by the significant increase of multiple cytokines and chemokines when the monkeys PBMCs were stimulated with different pools of SIV peptides. Specifically, concentrations of TNFα, IFNγ, RANTES, MIP-1α, MIP-1β, and IL-1β significantly increased after PBMCs were stimulated with SIV PCS, Gag or Env peptides. These cytokines or chemokines are produced by activated CD8+, CD4+ T cells, macrophages, and NK cells, and have antiviral properties (IFNγ) and inhibitory effects on HIV infection (IFNγ, RANTES, MIP-1α, MIP-1β).

Conclusion: The NANOpcs vaccine, which delivers SIV PCS peptide immunogens based on the new nanoformulations developed in this study, can induce robust cellular im-

mune response to SIV antigens in cynomolgus macaques. Our custom-developed multiplexed cytokine/chemokine assay demonstrates greatly improved capacity in detecting antigen-specific cellular immune responses compared to traditional IFN-γ ELISPOT, a single cytokine assay. The NANOpcs vaccine, with confirmed immunogenicity, is ready to be tested for efficacy of protection against SIV challenge in the cynomolgus macaque model.

BSP8.04

Mucosal Inflammatory Responses to Vaccines Targeting Different SIV Immunogens

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Background: Mucosal inflammatory cytokine/chemokine profiles were associated with susceptibility/resistance to HIV infection. Vaccines generating more focused immune responses may limit cytokines and chemokines production by activated immune cells and improve efficacy of protection. In this study we compared mucosal inflammatory cytokine/chemokine profiles in response to a vaccine targeting 12 protease cleavage sites versus a vaccine targeting full Gag and Env in a nonhuman primate model,

Objective: Evaluate mucosal inflammatory responses by measuring levels of inflammatory cytokines/chemokines in genital mucosa of immunized cynomolgus macaques.

Methods: Three groups of eight cynomolgus macaques were vaccinated intramuscularly with rVSV control vector, rVSVpcs or rVSVgag/env. Cervicovaginal lavage (CVL) samples were collected weekly and a customized 14-plex multiplexed protein assay was used to measure 14 pro- and anti-inflammatory cytokines and chemokines to evaluate the mucosal inflammatory responses. A NanoOrange Protein Quantification Kit was used to measure total protein concentration.

Results/Discussion: Higher levels of pro-inflammatory cytokines were observed in the rVSV vector control group compared with the rVSVpcs and rVSVgag/env groups. Monkeys immunized with rVSVpcs appear to have a more restricted mucosal inflammatory response and higher levels of cytokines and chemokines associated with decreased risk of HIV-1 acquisition (RANTES, MIP-1α, MIP-1β, and IFNγ) in comparison with monkeys immunized with rVSVgag/env. Further boosts with rVSVpcs did not increase aberrant inflammatory response as observed in rVSVgag/env group. Higher levels of cytokines/chemokines associated with increased susceptibility to HIV-1 infection (IL8, IP10 and IL-1β) were observed in the group of monkeys immunized with rVSVgag/env.

Conclusion: s: rVSVpcs vaccine generated more focused and beneficial mucosal inflammatory response profiles in cynomolgus macaques than the rVSVgag/env vaccine. The more focused mucosal inflammatory responses may potentially lead to better vaccine efficacy by avoiding unnecessary and excessive immune activation.

Mechanisms of HIV Pathogenesis (including animal models) and Co-Morbidities

Mécanisme de pathogénèse du VIH (dont les modèles animaux) et les comorbidités

BSP9.01

Cervicovaginal Epithelial Disruption Modified by Bacteria Increases HIV Acquisition Risk in Young Women

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Backgroun[illegible]Un[illegible]rstanding mechanisms of HIV susceptibility in w[illegible]e[illegible] critical for HIV prevention efforts, but these a[illegible]o[illegible]ell defined. Here we utilized a metaproteomic [illegible]ap[illegible]ro[illegible]o identify cervicovaginal factors underlying [illegible]uisition risk in women from the CAPRISA 004 trial.

Methods: Cervicovaginal lavage samples from the last HIV negative time point in 63 women who acquired HIV during the trial (cases), and 638 women who remained uninfected, were analyzed by mass spectrometry, identifying 5,678 host and bacterial proteins. Relationships to HIV infection risk were assessed by Cox PH models. Bacterial co-cultures, and in vivo RNAseq data of early infectious foci from vaginal tissues of SIV/SIV challenged-rhesus macaques (RM), were used to examine relationships to bacteria and virus susceptibility, respectively.

Results: Downregulated proteins associating with epithelial development and cell-cell adhesion pathways (P<0.0001) best classified HIV cases from controls (OR: 3.7 (2.1-6.6), P=2.21E-07), signifying epithelial barrier disruption (EBD). Women with EBD had similar baseline characteristics to those without EBD, but associated with a non-Lactobacillus dominant (non-LD) vaginal microbiome (P=0.002). While EBD modified risk in both Lactobacillus dominant (LD) (HR=3.15, 95% CI 1.52-6.65, P=0.001) and

non-LD women (HR=4.23, 95% CI 2.10-8.50, P=1.6E-05), EBD frequency was highest in women with diverse vaginal bacterial profiles (Prevotella, Mobiluncus, G. vaginalis, other anaerobes) (OR: 4.57 (2.45-8.64), P=9.88E-7). In vitro co-cultures showed anaerobic bacteria altered differentiation and cell-cell adhesion pathways in vaginal epithelial cells (P<0.05). In vivo, GSEA analysis showed EBD proteins could distinguish virus susceptible sites from non-susceptible sites in vaginal tissue of SIV-challenged RM (NES=1.95, P<0.0001).

Conclusions: This study provides evidence that perturbations to epithelial development pathways increase HIV acquisition risk and may represent vulnerable tissue sites favorable for virus. Direct epithelial-bacterial interactions may contribute to this process. Strategies reducing EBD may decrease HIV acquisition in young women.

BSP9.02

Mitochondrial Reprogramming Contributes to Monocyte Activation and Inflammatory Cytokine Production in HIV Infection

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Persistent inflammation and immune activation drive organ damage and the development of comorbid conditions in HIV patients on antiretroviral therapy (ART). Monocytes play a central role in this process but the biological mechanisms underlying their chronic activation remains poorly understood. Altered metabolism and mitochondrial function in CD4+ T cells has been shown to contribute to HIV pathogenesis but the role of metabolic reprogramming in regulating monocyte activation and function remains incompletely understood. Here, we used microarray data sets from monocytes isolated from HIV patients on suppressive ART for at least 6 months with Hepatitis C (HCV) to develop a metabolic signatures associated with treatment (GSE38542). A total of 432 metabolic genes were significantly altered in HIV patients compared to healthy controls (-1.5 ≤ FC ≥1.5, p value ≤0.05, FDR<0.1). Altered genes mapped to various aspects of energy, amino acid, lipid and nucleotide metabolism. Enrichment and topology analysis identified significant alterations (P<0.05) in pathways associated with core energy metabolism including the TCA cycle, one carbon metabolism, nicotinate and nicotinamide metabolism and mTOR signalling. Integrated pathway mapping and network analysis identified the upregulation of genes associated with mitochondrial metabolism, reactive oxygen species (ROS) production and the down regulation of genes associated with antioxidant responses. These alterations in cellular redox status were associated the upregulation of genes linked to the NLRP3-inflammasome and inflammatory cytokine production. Collectively, these data suggest that monocyte mitochondria may be repurposed to support ROS production in HIV patients on ART and that this mitochondrial repurposing may contribute to their hyper-inflammatory phenotype. Mitochondrial metabolism may represent a novel target to limit chronic activation and proinflammatory cytokine production in HIV patients on ART with HCV.

BSP9.03

Associating Progressive Liver Fibrosis with Generalized CD8+ T-cell Dysfunction in HIV-HCV Co-infection Before and After Antiviral Therapy

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Background: Hepatitis C virus (HCV) is an important comorbidity of HIV infection, often resulting in accelerated liver fibrosis leading to cirrhosis, hepatocellular carcinoma and end stage liver disease. Immune dysfunction is a feature of chronic HCV infection, including impaired HCV-specific $CD8^+$ T-cells. We and others have also observed generalized impairment of $CD8^+$ T-cell survival and signaling, and our findings suggest an association with liver fibrosis. This is clinically relevant given the role $CD8^+$ T-cells play in the pathogenesis of progressive liver disease, opportunistic infections and liver cancer risk in HIV-HCV co-infection. We have also shown that HCV core protein impairs cytolytic functions. Therefore, host and HCV factors impair $CD8^+$ T-cells. Our recent data shows unchanged cytolytic impairment following anti-HCV treatment in advanced fibrosis, to be evaluated in HIV-HCV co-infection.

Hypothesis: Liver fibrosis is associated with immune dysfunction in HIV-HCV co-infection, and persists after HCV cure in individuals with advanced liver disease.

Results: Study groups for cytolytic function assessment include HCV-treatment naïve, HCV mono- and HIV-HCV co-infected individuals (HAART-treated) before, during and after anti-HCV therapy, focusing on low (F0-1 <7.0 kPa) and high (F3-4, >14.0 kPa) liver fibrosis. We observed equivalently impaired IL-7 signaling in HCV mono- and HIV-HCV co-infection and lower cell survival in advanced fibrosis. In co-infection, IL-7-mediated proliferation was significantly reduced, wherein cell division in high fibrosis was half of that observed in low fibrosis. An assessment of cytolytic functions (e.g. IFN-g, perforin, CD107) will provide a comprehensive overview to compare to our HCV mono-infection data.

Conclusions: Liver fibrosis is a by-product of perturbed immune function, but our observations suggest reciprocal effects that are not well understood. Identifying immune correlates of progressive liver fibrosis will provide insights for the mechanisms of liver disease and reveal novel immune targets relevant to liver diseases of infectious or non-infectious origin.

BSP9.04

Investigating Neuro-Inflammation During HIV-1 Infection Using the BLT Humanized Mouse Model

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Current antiretroviral therapy does not address all complications of HIV-1 infection, such as neurocognitive disorders. In fact, ~50% of treated individuals experience HIV-associated neurocognitive disorders (HAND), and the prevalence of HAND is increasing. This suggests the need for a better understanding of HAND pathophysiology using an effective animal model.

We focus on the gut-brain axis and establishment of inflammation during HIV-1 infection of humanized mice. The gut-brain axis is particularly relevant as the largest population of target cells early in infection resides in the gut, and infection is associated with inflammation. Moreover, it has been established that bidirectional communication occurs between gut and brain to maintain homeostasis and modulate disease. We hypothesize that early HIV-1 infection in the gut alters the inflammation profile in both gut and brain, preparing the stage for dysfunctions manifesting as HAND. We specifically 1) investigate which inflammatory pathways (interferon response) are altered during HIV-1 infection of humanized mice and, 2) evaluate the neurological involvement of infection through human immune cell infiltration in brains.

Here, we utilized the Bone marrow Liver Thymus (BLT) model, where NSG mice are given a human immune system. BLT mice were infected intraperitoneally (i.p.) with live HIV-1. Human immune cells in brains were measured by flow cytometry and immunohistochemistry. Interferon response, gut epithelium and blood-brain barrier junctional integrities were assessed through qPCR.

HIV-1 led to notable changes in interferon responsive genes, especially increased expression of HLA-E in both brains and intestines. Changes in interferon response were associated with increased expression of the pore-forming claudin-15 in both intestines and brains, and decreased expression of barrier-forming claudin-5 in intestines, as well as infiltration of human macrophages in brains. Our results thus far underscore the BLT mouse model of infection as a tool for the characterization of HIV-1 neuro-inflammation and explore targets for HAND.

BSP9.05

Differential Expression of Protective CD73+ Memory CD4 T-cells and Regulatory T-cells (Tregs) in Virally Supressed HIV+ Adults with Diagnosed Atherosclerosis

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Background: HIV infection is associated with higher rates of atherosclerosis due to the chronic immune activation. It is well documented that memory CD4 T-cells which express adenosine producing ecto-5-nucleotidase (CD73) and regulatory T-cells (Tregs), play protective role against atherosclerosis. We assessed the CD73 expression and Tregs in association with immune activation and senescence in ART-treated HIV-infected adults with or without atherosclerosis *versus* HIV- individuals.

Methods: PBMC were obtained from sex and age matched 100 individuals including ART-treated HIV-infected adults with or without atherosclerosis (n=43 and n=31) and uninfected individuals with or without atherosclerosis (n=16 and n=10). Atherosclerosis was determined by computed tomography angiography of the coronary arteries performed on all participants. Treg subsets, T-helper (Th) cells, CD73 expression, immunosenescence ($CD28^-CD57^+$) and activation ($CD38^+$/$HLA\text{-}DR^+$) were assessed by flow cytometry.

Results: HIV^+ individuals versus uninfected participants had higher levels of immunosenescence and immune activation of CD4 and CD8 T-cells. The expression of CD73 on total CD4 T-cells was similar within study groups. However, HIV^+ individuals with atherosclerosis represented lowest levels of $CD73^+$ central memory CD4 T-cells. Importantly, lower frequencies of these cells correlates with higher volume of atherosclerotic plaques. In contrast, $CD73^+$ CD4 T-cells in HIV^+ individuals with atherosclerosis have mostly effector memory and terminally differentiated phenotype and highest levels of immunosenescence. HIV^+ individuals with atherosclerosis represent also the lowest frequencies of Th1/Th17 cells and highest Th2 and Tregs frequencies within study groups. However, Tregs in these individuals express lowest levels of CCR6 and CXCR3 within study groups.

Conclusion: ART-treated adults with atherosclerosis represent low frequencies of protective $CD73^+$ memory CD4 T-cells which were highly differentiated and senescent. This could affect negatively their protective properties against atherosclerosis. Furthermore, despite having highest frequencies of circulating Tregs, these cells might not be

able to infiltrate into atherosclerotic plaques to play their protector anti-inflammatory roles.

BSP9.06

Contributing Role of Deep Tissues in Viral Persistence Despite Intensive Early ART Therapy in SIV-infected Rhesus Macaques

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Antiretroviral therapy (ART) suppresses viral replication and reduces viral RNA to undetectable levels in the blood and peripheral lymph nodes (LNs) of HIV-positive individuals and SIV-infected monkeys. However, ART discontinuation always results in viral rebound. Because viral reservoir is seeded rapidly after infection, the main objective of the present study was to analyze the extent of early viral dissemination focusing on T cell subsets in deep tissues in comparison to peripheral LNs.

More than twenty rhesus macaques (RMs) were used for this study including healthy, ART treated and untreated SIV-infected RMs. RMs were euthanized at different time point post-infection during primary infection. Spleen, mesenteric and axillary/inguinal LNs were recovered immediately after euthanasia. TFH cells and non-TFH cells including naïve, central memory (TCM), effector memory (TEM) and terminally differentiated (TDT) were sorted, and viral RNA and DNA were quantified by RT-PCR.

Our results showed that viral DNA and RNA are essentially detected from day 11 post-infection. Viral DNA was mostly observed in TCM, TEM and TFH CD4 T cells subsets whereas viral RNA was detected in TEM and TFH cells. Most importantly, we demonstrated that despite an early ART therapy, which was administrated at day 4 post-infection, TEM and TFH $CD4^+$ T cells from the spleen and mesenteric LNs are the main reservoirs in ART-treated SIV-infected RMs. We observed the absence of viral DNA in peripheral LNs. These results are of crucial importance indicating potential viral reservoirs in deep tissues under ART, and strategy aims to cure HIV-infected individuals need to target these populations and anatomical sites.

This work was supported by the Canadian Institutes of Health Research (CIHR), and by the Canadian HIV Cure Enterprise Grant (CANCURE). JE thanks the Canada Research Chair program for financial assistance.

BSP9.07

Expression and Role of Chemokine Fractalkine in HIV Brain Inflammation: a New Approach to Understand and Treat HIV Neuro-pathogenesis

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HIV infection of microglia and astrocytes causes release of neurotoxic viral proteins with a neuro-inflammatory environment. Clinically, this results in HIV-associated neurocognitive disorders (HAND) with an uncontrolled prevalence in treated individuals. The objective is to shed light on HAND pathogenesis and study the interactions of HIV with neuroprotective factors. We focus on fractalkine, a chemokine highly produced by neurons that controls microglia neurophysiologic functions and reduces neuronal apoptosis. We hypothesize a potential modulation by HIV affecting HAND severity.

Human astrocytes were infected and stimulated with pro-inflammatory cytokines and fractalkine measured for its soluble and membrane-anchored forms. The enzymatic activity of ADAM-10, the metalloprotease responsible for fractalkine shedding, was evaluated with a fluorimetric assay. Infected macrophages were co-cultured with astrocytes to analyse fractalkine secretion. Microglia were infected and evaluated for fractalkine receptor expression and their functional responses to fractalkine (MAPK phosphorylation and production of neurotoxic products).

First, we showed that HIV infection does not directly impact fractalkine secretion in astrocytes. However, we observed a concentration dependant increase in TNF or IL-1β treated astrocytes. Notably, we demonstrated a potent impact of HIV infection on astrocyte response to inflammatory signals; a decrease in fractalkine secretion and increase in the membrane-anchored form. We used ADAM-10 inhibitor GI-254023X to demonstrate its role in fractalkine shedding, and observed a relevant impact of HIV on its cellular surface localisation rather than its enzymatic activity. Co-cultures of infected macrophages enhanced fractalkine secretion by astrocytes. At last, preliminary data suggested an effect of HIV on fractalkine receptor expression in microglia.

In conclusion, our results indicate a clear impact of HIV on fractalkine system in the brain. Considering its neuroprotective functions, reducing its shedding and functional responses in microglia could have important outcomes in chronic inflammation and immune activation. Overall, interventions with fractalkine-based treatments could offer neuroprotection and reduce HAND.

Molecular Mechanisms of Co-Infections

Mécanismes moléculaires des coInfections

BSP10.01

CMV-driven Natural Killer Cell Differentiation is Independent of NKG2C in HIV Infection

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Background: Selective expansion and maturation of NKG2C-expressing natural killer (NK) cells in cytomegalovirus (CMV) infection suggests an active role for NKG2C in this process. In human immunodeficiency virus (HIV)-infected individuals this subset expansion is exaggerated. Responding NK cells generally express CD57, downregulate FcεR1γ and exhibit enhanced antibody-dependent activation. Lack of NKG2C increases risk for HIV infection and accelerates disease progression. To test the possibility that these susceptibilities reflect reduced NK cell maturation, we compared the phenotypic and functional maturation of NK cells in NKG2C^{null} and matched control groups co-infected with CMV and HIV.

Methods: NKG2C^{null} individuals were identified by polymerase chain reaction. Phenotype (CD57, FcεR1γ) and functional (IFN-γ, TNF-α induction) NK cell responses were compared by flow cytometry following stimulation through natural cytotoxicity receptors (K562 cells) or through CD16 (monoclonal antibody, 3G8). Anti-CD16 redirected lysis of P815 cells and classical antibody-dependent cellular cytotoxicity (ADCC) against anti-human leukocyte antigen class I antibody-coated C1R cells were compared between groups. Antibody concentrations producing half maximal responses (EC_{50}) were determined by titration to measure and compare sensitivity to antibody-triggered killing.

Results: See Table.

	NKG2Cnull Donors [median, (IQR)]	NKG2Cpos Donors [median, (IQR)]	P
% CD57pos NK Cells	62.3 (47.4, 77.1)	57.7 (49.9, 65.6)	ns
% FcεR1γ neg NK Cells	38.7 (17.8, 59.5)	31.9 (20.6, 43.1)	ns
% IFN-γ pos NK Cells (K562)	3.3 (1.7, 4.2)	0.9 (0.4, 4.4)	ns
% TNF-α pos NK Cells (K562)	3.3 (0.9, 5.7)	3.1 (1.7, 4.5)	ns
% IFN-γ pos NK Cells (3G8)	11.0 (5.4, 16.7)	9.4 (4.6, 14.3)	ns
% TNF-α pos NK Cells (3G8)	8.7 (3.2, 14.6)	12.2 (4.2, 20)	ns
% Lysis [Saturating Ab] (P815)	20.7 (5.2, 29.1)	10.4 (2.6, 32.0)	ns
% Lysis [Saturating Ab] (C1R)	28.1 (15.0, 37.3)	18.2 (19.5, 30.6)	ns
EC50 (ng/mL, P815)	125	125	ns
EC50 (ng/mL, C1R)	1.1	1.2	ns

Conclusions: We found no phenotypic or functional deficit in NK cells from NKG2C^{null} individuals co-infected with HIV and CMV. This implies that either NKG2C plays no role in NK cell maturation in response to CMV infection or that alternate routes to enhanced effector function are available. Mapping these alternate routes may inform novel strategies for NK cell activation in therapeutic settings.

This research is supported by a CANFAR innovation grant.

Other

Autres

BSP5.01

Development of Diheteroamide-based Small-Molecules as a Novel Class of HIV-1 Inhibitors with Improved Safety Profile

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Background: Initial screens of compounds capable of inhibiting HIV-1 gene expression identified a stilbene-based compound 5350150 which significantly reduced the production of HIV-1 Gag and Env. However, the known photolabile/toxic properties of stilbene compounds rendered the molecule unsuitable for long term treatment option. Here we report the identification of noncytotoxic analogues of 5350150 where the C=C double bond has been replaced by an amide isostere, that display anti-HIV activity against a comprehensive panel of multidrug-resistant strains.

Methods: An exploratory library of fifty 5350150-amide analogues was prepared using the acyl fluoride–TMS amine condensation protocol. The anti-HIV-1 activity of these compounds was determined by a T-cell reporter assay. The level of infection was monitored using flow cytometry, and the adverse effect on cell viability was measured by Guava ViaCount Assay.

Results: Anti-HIV-1 activity was found to varying degrees for fifteen of the fifty 5350150 amide analogues, and one of the most potent compounds, GPS488, was studied in detail. Compound GPS488 exhibited activity against wild-type HIV-1IIIB (subtype-B), and HIV-1 97USSN54 (subtype-A) with EC50 values of 1.3μM and 1.0μM, respectively. For multidrug-resistant viruses, GPS488 inhibits an HIV-1 variant resistant to both NRTI and NNRTI with EC50 of 1.2μM. Compound GPS488 was also active against viruses resistant to protease inhibitors, integrase inhibitors, and CCR5 antagonist inhibitors with EC50's of 1.2μM, 1.0μM, and 1.0μM, respectively. The potential cytotoxicity of GPS488 was measured in therapeutic indexes. At the range of con-

centrations tested, a decrease in cell viability from 98.9% at 1.6µM to 59.2% at 100µM was observed.

Conclusions: These results show that GPS488 has potent anti-HIV activity against a broad panel of HIV-1 multidrug-resistant strains with a therapeutic index (CC50/ EC50) of approximately 100. The novel mechanism of action suggests that the compound could be used in conjunction with existing treatments or as a salvage therapy.

BSP5.02

Impact of Cervico-vaginal Microbiota of Highly HIV Exposed Commercial Sex Workers Women But Non HIV-infected

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Cervico-vaginal microbiome plays a fundamental role for enhancing innate local immunity. A few data are available about the diversity of the microbiota in Commercial Sex Workers (CSWs) and its role against HIV acquisition via mucosal inflammation.

The aim of this study was to assess wether the cervico-vaginal microbiome of the CSWs is associated with their genital inflammation and HIV infection status.

Ten women were enrolled in each groups : CSW /HIV+ , CSW/HIV- and healthy women control of the same community, in Cotonou, Benin. RNA 16S V4 hypervariable region was amplified using DNA extracted from cervico-vaginal lavage (CVL). Sequences were obtained with MiSeq and analysed using QIIME software with Sylva99 database. A panel of cytokines and chemokines were tested to assess the mucosal inflammatory response .

Statistical analysis was done by group and by cervicotyes defined on the frequency of OTUs.

By comparing the microbiome of each group, there was statistically difference beteween diversity of control group versus CSWs (Shanon index ; p = 0.0019). No difference were found between CSWs. We determined two different cervicotypes (CT) based on frequency of the OTUs : CT1 with preodominance of *Lactobacillus* and CT2, more heterogenous with anaerobies. CT2 was statistically associated with CSW's statut (n=15 ; p=0.003) and HIV statut (n= ; p=0.039). Furthermore, in the CSWs group, there was a trend for a statistical association between CT2 and HIV statut. The pro-inflammatory cytokine IL-1b and the anti-inflammatory cytokine TGFβ showed a higher level in CT2 and CT1 profile, respectively, with statistically significance.

These results confirmed the heterogenecity of CV microbiome of African women previously described; we found a predominance of *L. iners* as described for Rwanda CSWs. Cytokine pattern demonstrated an inflammatory profile associated with microbial diversity wich may play a role in acquisition of HIV.

BSP5.03

KIR3DL1 and HLA-Bw4 Expression Levels and Their Binding Affinity Influence Natural Killer (NK) Cell Responsiveness to Autologous HIV Infected CD4 T Cells

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Background: The interaction of inhibitory Killer Immunoglobulin-like Receptor (KIR)3DL1 (3DL1) on NK cells with HLA-Bw4 on self-cells educates NK cells and establishes tolerance to Bw4+ self-cells. HIV infection downmodulates HLA-A/B expression on HIV infected CD4 T cells (iCD4). This can interrupt inhibitory signals through 3DL1 favoring NK cell activation. 3DL1 and HLA-Bw4 are highly polymorphic. Most 3DL1 allotypes are expressed on the cell surface at low (l) or high (h) densities. In general, HLA-B allotypes can be categorized onto groups that interact with 3DL1 with affinities having the following hierarchy: Bw6<Bw4*80T<Bw4*80I, where 80T/80I refer to the aa 80 of the HLA heavy chain; Bw4*80I are expressed more densely than Bw4*80T allotypes. 3DL1/HLA-B expression levels and affinity can calibrate NK education, which in turn tunes the reactivity of 3DL1+ NK cells to target cells with no or downmodulated 3DL1 ligands. Here, we investigated the response of 3DL1+ NK cells from 3DL1/HLA-B allotyped subjects to autologous iCD4.

Methods: Cells from 20 healthy donors were studied. Isolated NK cells were co-cultured with autologous iCD4 (mean 43.1% p24+) or uninfected CD4 cells (for background correction) for 6 hours. The frequency of 3DL1+ NK cells secreting IFN-γ, CCL4 and expressing CD107a was measured.

Results: The frequency of 3DL1+ NK cells exhibiting the sum of all functions showed the following 3DL1/HLA-B group hierarchy: 3DL1/Bw6(1)<3DL1*l/*80T(2)=3DL1*h/*80T(3)< 3DL1*h/*80I(4). Between-group comparisons were significant for groups 1vs4, 2vs4 and 3vs4 (p<0.03 for all, Anova with Tukey's post-tests). A similar pattern was seen for total CCL4 secretion (p<0.004 for all, Anova). Between-group differences in the frequency of IFN-γ secreting and CD107a expressing NK cells did not achieve significance.

Conclusion: 3DL1/HLA-B expression density and affinity influences NK cell education potency and correlates positively with the frequency of 3DL1+ NK cells responding to autologous iCD4.

BSP5.04

Cost-effective Alternatives for Preparation and Distribution of HIVDR Genotyping Proficiency Panels for Laboratories in Resource-limited Settings

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Background: Cost-effective transportation of proficiency panels (PP) is a challenge for any external quality assessment program (EQAP). Current PP for HIV drug resistance (HIVDR) genotyping use serum or plasma which require stringent cold-chain transportation and thus are less suitable for resource-limited settings (RLS). This study explores alternative strategies that simplify the preparation and shipment of HIV PP while retaining HIV RNA integrity.

Methods: HIV-1 specimens with known viral loads (VL) were obtained from the External Quality Assurance Program Oversight Laboratory (EQAPOL, USA). These specimens were diluted using phosphate-buffered saline (PBS) or Tris-EDTA (TE) buffer covering a range of VLs (103~106 copies/ml). Dried tube specimens (DTS) were also prepared at comparable VLs. All preparations were stored for 4 weeks at 3 different temperatures; 4°C, room temperature (RT) and 37°C. HIV RNA was then extracted from all specimens and HIV RNA integrity was assessed using a well-established PCR protocol amplifying partial HIV-1 pol gene targeted in routine HIVDR genotyping. The VL reduction at the end of the time course was assessed using real-time PCR.

Results: The PBS group showed poor amplification at all three temperatures with either no detectable VL or VL reduction of 1.38~4.45 log. The DTS and TE groups showed 100% PCR success rate after storage at 4°C with an average VL reduction of <1 log. The TE group stored at RT achieved a similar outcome. DTS specimens stored at RT and 37°C as well as TE specimens stored at 37°C did not amplify due to average VL reduction of >1 log.

Conclusion: TE buffer helps to retain HIV RNA integrity during an extended storage or shipping period when cold-chain transportation is unavailable. Preparing HIVDR genotyping PP using TE buffer and shipping at RT could be an acceptable alternative for delivering such specimens to EQAP participant laboratories in RLS.

BSP5.05

A Hormonal Contraceptive is Associated with Diversity of the Vaginal Microbiota, an Altered Vaginal Microenvironment, and Enhanced Susceptibility to HIV-1

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Depot Medroxyprogesterone Acetate (DMPA), a hormonal contraceptive commonly used in Sub-Saharan Africa, is associated with increased risk of acquiring and transmitting Human Immunodeficiency Virus (HIV). Although women using DMPA are 1.4 times more likely to acquire HIV, the mechanism by which DMPA enhances susceptibility to HIV remains elusive. Recently, a significant association between diversity of the vaginal microbiota and increased risk of HIV acquisition was reported. We thus examined the effect of DMPA on diversity of the vaginal microbiota. In a prospective study of Kenyan women with Nugent Scores <7 (did not have Bacterial Vaginosis) attending the Sex Worker Outreach Program Clinics in Nairobi, we found the vaginal microbiota of women on DMPA had greater bacterial diversity than women not on hormonal contraceptives (1.77±0.23 vs. 1.10±0.25; Shannon Index; P=0.015; N=24, 21 respectively). In order to examine the underlying mechanism of DMPA correlating with bacterial diversity, we quantified vaginal glycogen and α-amylase, which are associated with colonization by protective lactobacilli. DMPA suppressed glycogen (2.02±0.51 vs. 7.64±1.79mg/mL; P=0.053), and α-amylase (2.43±1.02 vs. 6.81±1.35mU/mL; P=0.030). Interestingly, our results were recapitulated in humanized mice; treatment with DMPA increased bacterial diversity of the vaginal microbiota compared to treatment with estradiol (E_2) (3.73±0.37 vs. 1.28±0.74; Shannon Index; P=0.016; N=5, 4 respectively), and DMPA suppressed vaginal glycogen ($1.5x10^{-3}$±$9.0x10^{-4}$ vs. $1.1x10^{-2}$±$3.0x10^{-3}$mg/mL; N=10, 8; P=0.017) as compared to cycling humanized mice. Furthermore, humanized mice treated with physiological levels of DMPA were more likely to become infected following intravaginal HIV-1 challenge than cycling mice (77% vs. 35%; P=0.014; N=22, 20 respectively). Results suggest the DMPA is correlated with decreased vaginal glycogen and α-amylase, and enhanced bacterial diversity, which could potentially increase HIV-1 susceptibility. This is the first study to show a link between DMPA and alterations of the vaginal microbiota that could lead to increased susceptibility to HIV in women.

Clinical Sciences

Sciences cliniques

Adherence

Respect du traitement

CSP1.01

Evaluating the Implementation and Effectiveness of an Intervention to Re-engage Patients into HIV Care: an Implementation Science Research Protocol

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Background: UNAIDS' 90-90-90 targets have prompted formal documentation of HIV care cascades. Approximately 10% of people living with HIV (PLHIV) followed at the McGill University Health Centre are lost-to-follow-up (LTFU) annually. We aimed to develop an implementation science (IS) research protocol evaluating both implementation and effectiveness of an evidence-based intervention (EBI) to improve care engagement.

Methods: A scoping literature review was performed to identify pertinent EBIs. IS frameworks guiding the identification of barriers and facilitators (B&F) to delivery of the intervention, as well as outcome measures (implementation and effectiveness) were considered. The Standards for Reporting Implementation Science Studies (StaRI) Statement was used to guide protocol development and reporting.

Results: A combination EBI (creation of LTFU lists and re-engagement telephone calls by nurses) was selected. A single-arm, pre-post, mixed-methods prospective pilot study using a type 2 effectiveness-implementation hybrid design is proposed. Outcomes related to both implementation (i.e. acceptability, appropriateness, feasibility and adoption) and the EBI (i.e. effectiveness) will be evaluated. Using the Enhanced Replicating Effective Programs and Tailored Implementation for Chronic Disease frameworks, we identified important B&F to delivery of the EBI and prioritized implementation strategies to enhance adoption and sustainability of the EBI. Checklists, surveys and focus groups will be used to collect information from nurses on B&F, EBI fidelity and implementation outcomes throughout the study. Data collection through the clinical database will allow reporting on the overall effectiveness of the EBI (e.g., proportion of patients contacted and re-engaged).

Conclusions: We succeeded in integrating multiple IS frameworks to develop a clinic-based IS research protocol. By using an IS lens, we will optimize the real-world adaptation of a care re-engagement intervention and report on both implementation and effectiveness outcomes. The pilot study will begin in 2018. If successful, implementation of our EBI will be evaluated using a stepped-wedge cluster randomized trial.

CSP1.02

Provider Characteristics Associated with cART Adherence in People Living with HIV

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Objective: While HIV treatment has evolved rapidly since the introduction of combination antiretroviral therapy (cART), barriers remain for women living with HIV in accessing appropriate care. A multitude of systemic and individual factors impact adherence and access to treatment, including attitudes of healthcare providers. Identification of care provider attitudes and characteristics associated with increased patient cART adherence can be used to improve patient care and provider education with a goal of improving women's quality of life and decreasing healthcare costs.

Study Methods: A systematic review was conducted to identify provider characteristics associated with increased cART adherence. We performed searches of the electronic databases: CINAHL, EMBASE, PsycINFO, and PubMed. Studies were eligible for review if they were published between 1996 and 2017, conducted in adult people living with HIV (PLWH) in high income countries, and evaluated provider-based interventions or assessed patient viewpoints of provider characteristics associated with cART adherence.

Results: We screened 526 articles and excluded 160 duplicate papers, 146 papers from low and middle income countries, 31 papers that did not exclusively focus on HIV, 35 that focused on non-cART adherence, 79 papers unrelated to provider characteristics associated with cART adherence, 28 papers that focused exclusively on MSM or adolescents, and 3 papers that used research completed prior to 1996. We included 44 papers, most of which were qualitative studies.

Preliminary thematic analysis of reviewed studies showed that increased provider empathy and HIV/AIDS related education are associated with increased cART adherence in PLWH. Additionally, PLWH who feel more connected to their healthcare providers are more likely to maintain high cART adherence.

Conclusion: Increased provider empathy and education are associated with increased cART adherence in PLWH. These findings may pave the way for development of provider-targeted educational tools designed to increase cART adherence in PLWH.

CSP1.03

Canadian HIV Clinicians' Perception of Barriers to Antiretroviral Therapy (Art) Adherence Faced by People Living with HIV: a Qualitative Study

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Background: The success of ART depends on adherence. Understanding HIV clinicians' perceptions of adherence's barriers is important as this can affect its clinical management. Nevertheless, these perceptions are infrequently studied.

Methods: We conducted qualitative interviews with 20 Canadian clinicians specialized in HIV (Quebec: 12; Ontario: 3; Saskatchewan: 1; British Columbia: 4). Guided by the conceptual framework of Engler et al. (2017) comprised of six dimensions and 20 categories of barriers derived from a synthesis of qualitative studies with PLHIV in developed countries, we used an immersion/crystallization analysis to describe ART adherence barriers.

Results: Seventeen categories of barriers, grouped under the framework's six dimensions were identified. Clinicians most frequently reported health **insurance issues**, particularly coverage, noting that some PLHIV deferred purchasing ART because of co-payments (dimension: *Healthcare services and system*). Secondly, they stressed **substance use** for sexual purposes (dimension: *Lifestyle factors*). Thirdly, they underscored **depression** and a **belief** in certain **ART regimens as 'forgiving'** of missed doses (dimension: *Cognitive and emotional aspects*). Fourth, they mentioned **side effects**, **pill-count** and **dosing schedule** (dimension: *Characteristics of ART*). Fifth, they highlighted PLHIV's **financial** and **housing constraints**, **worries unique to immigrants**, and **fears that ART use** would **lead to HIV disclosure** (dimension: *Social and material context*). Finally, they addressed **psychiatric** and **physical comorbidities** and the associated **polypharmacy** and **pill fatigue** (dimension: *Health experience and state*).

Discussion: The consistency of our findings with the framework of Engler et al. (2017) highlights its utility in research of this type. However, our findings are distinguished by the relative concern for health insurance issues, sexually-focused substance use, and the belief in ART as 'forgiving.' Research on ART adherence barriers benefits from taking into account multiple perspectives, as considered systematically through a conceptual framework. Furthermore, contrasting patient-provider perspectives on these barriers may be useful in designing ART adherence management training.

Clinical Trials and Observational Studies of Antiretrovirals and Other HIV Therapies

Essais cliniques et études d'observation des antirétroviraux et autres thérapies anti-VIH

CSP2.01

Higher Prevalence of CXCR4-tropic HIV-1 Variants among Patients with Low Plasma Viremia

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Background: The majority of patients receiving combined antiretroviral treatment (cART) in Ontario, typically DTG+tenofovir/FTC, EVG/c/tenofovir/FTC, or RAL+tenofovir/FTC, maintain undetectable plasma viremia (<20 copies/ml). However, there is increase concern of a growing number of HIV-infected individuals showing very low-level viremia (£100 copies/ml) and/or experiencing frequent "blips", with no evidence of disease progression.

Methods: Plasma samples from patients experiencing low-level viremia (£100 copies/ml, n=22) or failing treatment (>1,000 copies/ml, n=76) were obtained during routine care. An ultrasensitive HIV-1 genotyping assay based on deep sequencing (DEEPGEN™) was used to determine both drug resistance and coreceptor tropism.

Results: The vast majority of patients (18%) experiencing low-level viremia showed no evidence of primary or secondary drug resistance whereas nearly all patients (>90%) failing cART showed clear evidence of drug resistance. Interestingly, a higher prevalence of CXCR4-tropic (X4) viruses was observed among individuals with low level viremia compared with patients failing cART with higher plasma viremia (15/22, 68% vs. 20/76, 26%, $p < 0.003$, respectively).

Conclusions: In this relatively small cohort of patients, consistent low plasma viremia (£100 copies/ml) -despite otherwise effective antiretroviral treatment- seems to be linked to a higher prevalence of CXCR4-tropic variants. Our results suggest a possible viral breakthrough and/or spill-over from a sanctuary site of replication. Since HIV-1 X4 variants have been associated with greater pathogenicity and elevated plasma viral loads in the absence of treatment, it is important to closely monitor these individuals.

CSP2.02

Phase 3 Randomized Controlled Trial of Switching to F/TAF from ABC/3TC in Virologically Suppressed Adults: Week 48 Results

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Objectives: Tenofovir alafenamide (TAF) has improved bone and renal safety profile compared to tenofovir disoproxil fumarate with similarly high virological efficacy. Data are limited regarding directly comparing TAF with abacavir (ABC). We evaluated efficacy and safety of switching to emtricitabine and TAF (F/TAF) from ABC and lamivudine (ABC/3TC), each while continuing the same third agent.

Methods: In a 96-week (wk) randomized, double-blind, active-controlled study, virologically suppressed HIV-1 positive adults receiving ABC/3TC-containing regimens were eligible. Primary endpoint was virologic success (HIV-1 RNA < 50 c/mL) at wk 48 by snapshot algorithm with a noninferiority margin of 10%. Analyses included efficacy at wk 48 in participants who enrolled prior to 23 May 2016 (i.e. when the prespecified target sample size was reached), and safety in all enrolled participants.

Results: 556 participants were randomized and treated (F/TAF 280, ABC/3TC 276): at baseline, median age 52 yrs, 18% women, median estimated glomerular filtration rate (eGFR) 101 mL/min. Third agents included non-nucleoside reverse transcriptase inhibitors (52%), boosted protease inhibitors (30%), and integrase inhibitors (17%). At wk 48, virologic success was maintained in 90% (227/253) in F/TAF group vs 93% (230/248) in ABC/3TC group (difference -3.0%; 95% CI -8.2% to 2.0%), demonstrating noninferiority of F/TAF to ABC/3TC. Emergent resistance was rare (0.4% vs 0.4%). Few participants had drug-related serious adverse events (0.7% vs 0.4%). Drug discontinuation due to AEs occurred in 4% vs 3%, respectively. There were no cases of proximal renal tubulopathy in either group. Changes in renal and bone safety parameters and in lipids were similar between the two groups.

Conclusions: In virologically suppressed adults, switching from ABC/3TC to F/TAF, while continuing the same third agent, maintained high efficacy. The renal and bone safety profile of TAF was not different from ABC. F/TAF is a safe and effective backbone for HIV-positive individuals.

CSP2.03

Similar Efficacy and Safety by Subgroup in DRIVE-AHEAD: Doravirine/Lamivudine/Tenofovir DF (DOR/3TC/TDF) vs Efavirenz/Emtricitabine/TDF (EFV/FTC/TDF)

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Results from DRIVE-AHEAD, a phase 3, randomized (1:1), multicenter, double-blind, 96-week non-inferiority trial of once daily DOR/3TC/TDF (100/300/300 mg) vs EFV/FTC/TDF (600/200/300 mg) in HIV-1 infected, treatment-naïve adults, demonstrated non-inferior efficacy and a superior safety profile for neuropsychiatric events and fasting lipids at week 48. Analyses by prespecified subgroups and selected prognostic subgroups were conducted to further characterize the findings. Randomization was stratified by screening HIV-1 RNA (≤/>100,000 copies/mL) and hepatitis B/C coinfection. The primary endpoint was the proportion of participants achieving HIV-1 RNA <50 copies/mL at week 48 (FDA Snapshot approach). Baseline characteristics were balanced, and HIV-1 RNA <50 copies/mL was achieved by 84% and 81% of DOR/3TC/TDF and EFV/FTC/TDF recipients, respectively. For subgroup analyses, week 48 efficacy results were summarized within prespecified subgroups using the Observed Failure approach (participants missing data for reasons other than efficacy were excluded), and adverse events (AEs) were summarized by selected subgroups. Across the prespecified and selected demographic and baseline prognostic factors, proportions of participants with HIV-1 RNA <50 copies/mL at week 48 were comparable (Table). Similar results were observed using the HIV-1 RNA cutoffs of 40 and 200 copies/mL and in change from baseline in CD4+ T-cell counts. In the safety analysis, similar AE rates between treatment groups were observed across subgroups. At week 48, across all baseline subgroups and prognostic factors, DOR/3TC/TDF demonstrated comparable virologic and immunologic efficacy and safety to that of EFV/FTC/TDF in HIV-1 treatment-naïve adults.

Proportion of Participants With HIV-1 RNA <50 Copies/mL at Week 48 by Prognostic and Demographic Factors
(Observed Failure Approach*)

Prognostic and	DOR/3TC/TDF QD		EFV/FTC/TDF QD		Treatment Difference
Demographic Factors	n/N	%	n/N	%	% (95% CI)†
All Participants	307/346	88.7	294/331	88.8	-0.2 (-4.9, 4.6)
Gender					
Male	257/290	88.6	250/283	88.3	0.0 (-5.2, 5.2)
Female	50/56	89.3	44/48	91.7	-2.9 (-15.1, 9.3)
Baseline Plasma HIV-1 RNA (copies/mL)					
≤100,000 copies/mL	251/277	90.6	235/258	91.1	-0.5 (-5.5, 4.4)
>100,000 copies/mL	56/69	81.2	59/73	80.8	1.0 (-12.4, 14.3)
≤500,000 copies/mL	301/337	89.3	282/314	89.8	-0.4 (-5.2, 4.3)
>500,000 copies/mL	6/9	66.7	12/17	70.6	0.0 (-41.4, 41.4)
Baseline CD4+ T-Cell Counts (cells/mm^3)					
≤200 cells/mm^3	29/42	69.0	36/43	83.7	-14.6 (-33.2, 3.9)
>200 cells/ mm^3	278/304	91.4	258/288	89.6	1.8 (-3.0, 6.5)
Hepatitis Coinfection Status‡					
Hepatitis B/C positive	8/9	88.9	8/8	100	-12.0 (-42.9, 18.9)
Hepatitis B/C negative	299/337	88.7	286/323	88.5	0.1 (-4.8, 4.9)
Viral Subtype					
Subtype B	195/222	87.8	202/226	89.4	-1.3 (-7.2, 4.6)
Subtype Non-B	110/122	90.2	92/105	87.6	2.1 (-6.3, 10.4)
Geographic Region					
Africa	29/34	85.3	22/27	81.5	3.9 (-16.6, 24.4)
Asia/Pacific	56/58	96.6	51/57	89.5	7.1 (-3.1, 17.3)
Europe	75/83	90.4	79/85	92.9	-4.6 (-13.0, 3.7)
South America	77/89	86.5	75/80	93.8	-7.2 (-16.5, 2.1)
North America	70/82	85.4	67/82	81.7	4.8 (-6.5, 16.1)

*Participants who prematurely discontinued assigned treatment due to lack of efficacy were classified as failures after treatment discontinuation; participants with data missing for reasons other than lack of efficacy were excluded from the analysis.

†The 95% CIs were calculated using stratum-adjusted Mantel-Haenszel method.

‡Hepatitis B surface antigen and/or HCV RNA by polymerase chain reaction (PCR) quantitative test.

n/N = (number of participants with HIV-1 RNA <50 copies/mL) / (number of participants in subgroup).

DOR/3TC/TDF, doravirine/lamivudine/tenofovir disoproxil fumarate; EFV/FTC/TDF, efavirenz/emtricitabine/tenofovir disoproxil fumarate.

CSP2.04

DRIVE-FORWARD Subgroup Analyses: Doravirine (DOR) Once-Daily (QD) vs Ritonavir-Boosted Darunavir (DRV+r) QD for Treatment-Naïve HIV-1–Infected Participants

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DRIVE-FORWARD is a phase 3, randomized (1:1), multicenter, double-blind, non-inferiority trial evaluating the safety and efficacy of DOR 100 mg QD vs DRV+r 800/100 mg QD (each in combination with emtricitabine/tenofovir disoproxil fumarate or abacavir/lamivudine) in treatment-naïve adults with HIV-1 infection for up to 96 weeks. The primary endpoint was the proportion of participants achieving HIV-1 RNA <50 copies/mL at week 48 (FDA Snapshot approach). The noninferiority margin was 10%. Randomization was stratified by screening HIV-1 RNA and nucleoside reverse transcriptase inhibitor (NRTI) therapy. Baseline demographics were balanced across groups. To further characterize the effects of DOR, results at week 48 were summarized within prespecified subgroups using the observed failure approach for missing data. At week 48, 84% of the DOR group and 80% of the DRV+r group achieved HIV-1 RNA <50 copies/mL (difference: 3.9%; 95% CI, -1.6%, 9.4%), demonstrating noninferior efficacy. The proportions of participants with HIV-1 RNA <50 copies/mL at week 48 across selected baseline demographic and prognostic factors were comparable between the DOR and DRV+r groups (Table). Similar subgroup results were observed using the HIV-1 RNA cutoffs of 40 and 200 copies/mL and change from baseline in CD4+ T-cell counts. Overall, at week 48 virologic and immunologic efficacy of DOR 100 mg QD was comparable to DRV+r on a background of 2 NRTIs in HIV-1 treatment-naïve adults across demographic and baseline prognostic factors, including gender, baseline HIV-1 RNA >100,000 copies/mL, baseline CD4+ T-cell count <200 cells/mm^3, NRTI background therapy, hepatitis coinfection, and viral subtype.

Proportion of Participants With HIV-1 RNA <50 Copies/mL at Week 48 by Prognostic and Demographic Factors (Observed Failure Approach)					
Prognostic and Demographic Factors	DOR 100 mg QD		DRV+r 800/100 mg QD		Δ (DOR – DRV+r)*
	n	%	n	%	% (95% CI)
All Participants	321	88.2	306	86.2	1.9 (-3.1, 6.8)
Gender					
Male	269	89.1	268	88.2	0.9 (-4.3, 6.0)
Female	52	83.9	38	74.5	8.1 (-7.4, 23.6)
Baseline Plasma HIV-1 RNA (copies/mL)†					
≤100,000 copies/mL	257	90.2	250	88.7	1.5 (-3.7, 6.8)
>100,000 copies/mL	64	81.0	55	76.4	3.0 (-11.2, 17.1)
≤500,000 copies/mL	307	88.5	299	87.4	0.9 (-4.0, 5.9)
>500,000 copies/mL	1	82.4		50.0	30.9 (-4.1, 65.9)
Baseline CD4+ T-Cell Counts (cells/mm^3)					
≤200 cells/mm^3	34	82.9	44	72.1	9.4 (-7.4, 26.2)
>200 cells/ mm^3	287	88.9	262	89.1	-0.2 (-5.2, 4.9)
Hepatitis Coinfection Status‡					
Hepatitis B and/or C positive	9	90.0	13	76.5	11.6 (-24.3, 47.4)
Hepatitis B and C negative	312	88.1	293	86.7	1.4 (-3.7, 6.4)
Viral Subtype					
Subtype B	224	88.2	222	87.1	0.9 (-5.0, 6.8)
Subtype Non-B	97	88.2	84	84.0	2.8 (-6.6, 12.3)
NRTI Therapy					
FTC/TDF	278	88.0	270	86.5	1.3 (-3.9, 6.5)
ABC/3TC	43	89.6	36	83.7	5.9 (-9.1, 20.9)
Geographic Region					
Africa	19	90.5	15	78.9	8.8 (-14.9, 32.6)
Asia/Pacific	9	75.0	2	66.7	4.5 (-68.3, 77.4)
Europe	149	92.0	149	88.7	3.1 (-3.5, 9.8)
Latin America	37	97.4	28	84.8	14.1 (0.2, 28.0)
North America	107	81.7	112	84.8	-2.9 (-12.1, 6.3)

*The 95% CIs were calculated using stratum-adjusted Mantel-Haenszel method.

†In the DRV+r treatment group, 1 participant did not have successful baseline HIV-1 RNA result and was not included in the analysis for baseline HIV-1 RNA subgroups.

‡Hepatitis B surface antigen and/or HCV RNA by polymerase chain reaction (PCR) quantitative test.

n (%): Number (proportion) of participants within each subgroup with HIV-1 RNA <50 copies/mL at week 48.

ABC/3TC, abacavir/lamivudine; DOR, doravirine; DRV+r, darunavir + ritonavir; FTC/TDF, emtricitabine/tenofovir disoproxil fumarate; QD, once-daily.

CSP2.05

Switching to Elvitegravir/Cobicistat/Emtricitabine/Tenofovir Alafenamide (E/C/F/TAF) in Virologically-Suppressed Patients Harboring Mutation M184V/I

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Background: Switching to once-daily E/C/F/TAF in HIV-1 infected patients was shown to be effective and safe through 144 weeks. No data exist evaluating the efficacy of E/C/F/TAF in subjects harboring the M184V/I resistance mutation.

Methods: This is an ongoing, prospective, open-label, single arm, multicenter study evaluating the efficacy and safety of switching to E/C/F/TAF in subjects receiving emtricitabine/tenofovir disoproxil fumarate or abacavir/lamivudine plus a third antiretroviral agent. Subjects had a historical genotype report showing M184V/I and no evidence of previous virologic failure or resistance to boosted PIs or INSTIs. The primary objective was to evaluate the efficacy of switching to E/C/F/TAF in maintaining HIV-1 RNA <50 copies/mL at Week (W) 12. Subjects with discontinuation or missing values were considered responders if last HIV-1 RNA <50 copies/mL.

Results: 37 subjects (mean age 50, 22% women) were switched to E/C/F/TAF. All subjects had HIV RNA <50 copies/mL at baseline and the M184V/I mutation based on historical resistance tests. Archived DNA resistance testing found 43% (16/37) of subjects had M184V/I. All 37 subjects maintained HIV-1 RNA <50 copies/mL by W12. Three subjects discontinued prior to W12 with the last recorded HIV-1 RNA <50 copies/mL. There were no virologic failures and no cases of emergent resistance. Four serious adverse events (AEs) occurred were not considered study drug-related: 1 each of squamous cell carcinoma, acute kidney injury (due to poorly controlled hypertension and diabetes), transient proteinuria which resolved while on study drug and pulmonary embolism. Only one subject experienced an AE (muscle spasms) leading to premature discontinuation.

Conclusions: In this primary analysis, 100% of HIV-1 suppressed subjects with baseline M184V/I mutations who switched to E/C/F/TAF maintained HIV suppression at W12 with no emergent resistance. E/C/F/TAF was well tolerated. Subjects will be followed for 48 weeks to establish the durability of HIV suppression on E/C/F/TAF.

CSP2.06

Safety and Efficacy of E/C/F/TAF in HIV-Infected Adults on Chronic Hemodialysis

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Background: Elvitegravir (EVG)/cobicistat (COBI)/emtricitabine (FTC)/tenofovir alafenamide (E/C/F/TAF) is approved for use in HIV-1 infected individuals with mild-moderate chronic kidney disease (estimated glomerular filtration [eGFR] 30-69 mL/min). Current HIV treatment for individuals with renal failure on hemodialysis (HD) requires complex regimens with multiple pills. This is the first study to evaluate safety, efficacy, and pharmacokinetics (PK) of a daily single-tablet regimen (STR) in HIV-infected adults with end stage renal disease (ESRD) on chronic HD.

Methods: HIV-1 infected, virologically suppressed adults with ESRD (eGFR <15mL/min) on chronic HD for ≥6 months were switched to open-label E/C/F/TAF once-daily for 48 weeks (W). Efficacy was assessed as the proportion of participants with HIV-1 RNA <50 copies (c)/mL via snapshot algorithm. Maintenance of virologic suppression, safety, and patient satisfaction were assessed throughout the study. A PK substudy was done at or between W2 and 4. W24 data are presented here and W48 data will be available for the conference.

Results: We enrolled 55 participants; median age 51yrs, 24% female, 82% Black, median time on HD 6yrs, median CD4 count 515 cells/mL, 22% Hepatitis C Ab-positive, and 27% history of diabetes. At W24, 87% (48/55) had HIV-1 RNA <50 c/mL. The other 7 participants discontinued due to lack of efficacy (n=1), AE (n=2), or other reasons (n=4). EVG, COBI, and TAF PK were consistent with exposures in normal renal function. As expected, exposures of FTC and TFV (metabolite of TAF), which are renally eliminated, were higher v. historical data in normal renal function. Two participants discontinued E/C/F/TAF due to AEs (allergic pruritis, related; staphylococcal endocarditis, unrelated). 79% of participants felt "much more satisfied" with the STR convenience compared to baseline.

Conclusions: Switching to E/C/F/TAF STR maintained virologic suppression at W24, was well tolerated, and more convenient for adults with ESRD on HD.

CSP2.07

Dolutegravir with Boosted Darunavir Treatment Simplification for Transmitted HIV Thymidine Analog Resistance in Manitoba, Canada

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Objectives:

Primary, transmitted thymidine analog mutation (TAM) resistance poses challenges in treatment naïve patients; complicated regimens, with increased pill burden and costs, are utilized to achieve virologic suppression. Safe, cost-effective simplification strategies are required to maintain efficacy.

Methods: We reviewed a single site with management of thymidine analog mutations in treatment naïve individuals. Baseline genotypic analysis was performed on all patients; phenotypic analysis was performed on three patient samples. Patients with primary, transmitted TAM-1 resistance diagnosed between 2013 and 2015 were included. Patients started first line nucleoside reverse transcriptase inhibitor sparing therapy. Adherent patients who demonstrated sustained virological suppression of at least 12 months were eligible to receive simplification therapy with darunavir 800 mg, ritonavir 100 mg, and dolutegravir 50 mg given once daily.

Results: Twenty-six patients were diagnosed with transmitted TAM-1 pathway resistance. Twenty five started ART; twenty three remain on treatment. Phenotypic analysis demonstrated reduced response to zidovudine (ZDV), stavudine (d4T), and tenofovir (TDF). Twelve adherent, virally suppressed patients switched to simplification therapy with darunavir 800 mg, ritonavir 100 mg, and dolutegravir 50 mg (locally referred to as the "Double D" regimen). One was intolerant and requested return to a prior regimen. Eleven continued Double D; over 8 patient years all have demonstrated sustained suppression with undetectable viral loads.

Conclusions: Virologic suppression is sustained following simplification to Double D therapy in the treatment of adherent patients harbouring the TAM-1 mutation pathway.

Co-infections (including HCV, HBV, HPV, Syphilis, TB)

Coinfections (y compris VHC, VHB, papillomavirus, syphilis, tuberculose)

CSP3.01

HIV-positive Men's Knowledge, Experience, and Attitudes Regarding Human Papillomavirus ((HPV) Vaccination

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Background: HPV vaccine offers protection against the oncogenic HPV types that cause >90% of anal cancers. HIV co-infection substantially elevates anal cancer risk. We assessed self-reported receipt and willingness to receive HPV vaccine among HIV-positive men.

Methods: The OHTN Cohort Study follows people attending 9 specialty HIV clinics across Ontario. From 04/2016 to 06/2017, 1,688 men answered questions regarding vaccine knowledge and receipt of HPV vaccine. Unvaccinated men were asked their (1) likelihood of receiving HPV vaccine under 3 cost scenarios; and (2) attitudes towards vaccination based on the Theory of Planned Behaviour. We used logistic regression to identify independent correlates being "likely" or "very likely" to accept an offer of free vaccination; results are reported as adjusted odds ratios (AOR) with 95% confidence intervals (CI).

Results: Men (median 53 years, IQR 45-59) self-identified as gay (72%), heterosexual (19%), bisexual (8%) or other (1%). 63% had heard of the HPV vaccine and 45% knew that it was recommended for males. Only 14% reported that a health professional had discussed it and 7% were vaccinated. Men were likely/very likely to get vaccinated if it were: free of charge (74%); $30/dose (56%); or full price of $500 (17%). Correlates of willingness to be vaccinated were: younger age (AOR per 10+ years: 0.64, 0.56-0.74); beliefs that vaccine is safe (AOR: 1.76, 1.26-2.46), one's doctor considers it important (AOR: 3.70, 2.29, 5.97), and people important to them encourage it (AOR: 1.38, 1.04-1.83). Negative correlates were beliefs that one's behavior does not place them at risk (AOR: 0.29, 0.22-0.38) or the vaccine would not help because of preexisting HPV (AOR: 0.29, 0.19-0.43). Willingness did not vary with sexual orientation or ethnocultural identification.

Conclusion: Men were generally willing to accept HPV vaccination, but its cost was a major barrier. Facilitators included provider recommendations and self-perceived risk.

CSP3.02

CD4 Recovery After the Treatment of Hepatitis C Virus (HCV) in HIV-HCV Co-Infected Adults

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Background: HIV-HCV co-infection blunts CD4 T-cell gain after antiretroviral therapy (ART). Direct-acting antivirals (DAAs) can cure HCV in the majority of co-infected persons. We investigate the impact of HCV cure on CD4 progression after treatment.

Methods: Data were analyzed from a Canadian prospective cohort of HIV-HCV co-infected adults (n=1756). We included participants without Hepatitis B, receiving ART, with CD4 count measured as of 12 weeks following HCV treatment completion (n=371). A mixed effects linear model estimated the annual rate of change in CD4 count [SQRT] according to whether participants achieved sustained virologic response (SVR). We performed a sensitivity analysis restricted to HIV virally suppressed participants. Absolute CD4 count was also modeled for ease of clinical interpretation.

Results: Participants (21% female) were followed for a median of 1.7 years (IQR 0.9-3.7). The median age was 49 years; pre-treatment CD4 count, 464 cells/μL; ART duration, 9 years. 154 participants received DAAs; 166 received peg-interferon/ribavirin; 51 received both simultaneously. Responders had similar pre-treatment characteristics as non-responders except for longer duration of HIV infection, less active injection drug use, and higher income. Participants who achieved SVR had an increased annual CD4 gain, particularly when HIV was suppressed, gaining an additional 24 cells per year (95% CI 1; 46) compared to non-responders. Detectable HIV RNA and advanced liver disease were negatively associated with CD4 levels.

Conclusion: HCV cure may improve CD4 recovery in HIV-HCV co-infected patients. However, this impact is modest in patients receiving long-term ART and will be blunted without continued HIV suppression.

Table 1: Multivariate analysis of the annual change in the square-root of CD4 count post-HCV treatment

	Main analysis	HIV virally suppressed (≤ 50 copies)
Variable	**Adjusted coefficients (95% CI)**	**Adjusted coefficients (95% CI)**
(Intercept) *	19.2 (15.54 ; 22.85)	18.02 (13.39 ; 22.65)
Time (in years) *	0.19 (-0.03 ; 0.42)	0.15 (-0.2 ; 0.49)
SVR status and time interaction	0.19 (-0.1 ; 0.48)	0.43 (0.01 ; 0.85)
Age	0.04 (-0.03 ; 0.11)	0.04 (-0.04 ; 0.13)
Female	1.5 (0.06 ; 2.94)	1.68 (-0.07 ; 3.43)
ART duration (in years)	0.04 (-0.05 ; 0.14)	0.03 (-0.08 ; 0.15)
Nadir CD4 (per 100 cells)	1.27 (0.89 ; 1.66)	1.52 (1.06 ; 1.99)
Advanced liver disease	-2.76 (-3.99 ; -1.53)	-2.79 (-4.24 ; -1.33)
Previous HCV treatment	0.33 (-1.23 ; 1.9)	0.65 (-1.16 ; 2.45)
Active injection drug use	-0.85 (-2.04 ; 0.35)	-0.51 (-1.96 ; 0.93)
HIV RNA > 50 copies †	-1.37 (-1.94 ; -0.8)	

* Random intercept and slope

† Time-updated covariate

Advanced liver disease was determined by clinical diagnosis or by APRI≥2

CSP3.03

Enhanced Syphilis Screening Among HIV-Positive Men: Patients' Perspectives on a Clinic-based Routinized Syphilis Screening Intervention

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Background: The Enhanced Syphilis Screening Among HIV-Positive Men (ESSAHM) trial used a cluster-randomized stepped wedge design at four hospital-based HIV clinics in Toronto and Ottawa to pair syphilis testing with routine viral load tests for all male HIV patients. As part of our process evaluation, we explored patients' perspectives on the acceptability of routine syphilis testing.

Methods: We conducted patient exit interviews (n=22) at each of the four trial sites upon completion of the trial intervention period (31/07/2017). Patients were recruited using purposive and volunteer sampling methods. Patients shared their experiences of the ESSAHM trial specifically, and their insights on barriers and facilitators to routine syphilis testing more broadly. Interviews were semi-structured and ranged between 10-35 minutes. All interviews were audio-recorded and transcribed verbatim. Interview data were analyzed iteratively using methods informed by grounded theory.

Results: Overall, interviewees were in support of routine syphilis testing paired with standard HIV bloodwork, in part due to their knowledge of increased syphilis cases in their communities. Respondents preferred routine syphilis testing over having to request a test themselves or getting tested at the request of their healthcare provider. Some men additionally noted that regular testing might increase knowledge and comfort surrounding one's health status, particularly since new syphilis infections could be detected and treated early. When specifically asked, participants did not identify any limitations of regular syphilis testing.

Discussion: Men were in support of implementing syphilis testing as part of standard HIV care. ESSAHM is the first study to evaluate routine syphilis testing at multiple clinics using a controlled trial design. Lessons learned from trial findings, including patient perspectives, will guide practice decisions leading to earlier diagnosis and treatment of syphilis and improved prevention and control efforts in these and other HIV clinics in Ontario and internationally.

CSP3.04

Liver Fibrosis Stage Regression in HIV/HCV Co-Infected Patients after HCV Treatment in Community and Prison Settings in British Columbia

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Introduction: An estimated 20-30% HIV infected individuals in Canada have chronic hepatitis C (HCV) co-infection. Chronic HCV/HIV co-infection may result in more rapid hepatic fibrosis progression and consequently cirrhosis. Liver stiffness, measured in kilopascals (kPa) using elastography, has been demonstrated to correlate with fibrosis. Current HCV treatment with direct acting antivirals (DAAs) yield a sustained virologic response (SVR) >=95%. Additionally, fibrosis can regress, even in the advanced stages. This study evaluates fibrosis changes following treatment with DAAs in HIV/HCV co-infected patients.

Method: Retrospective chart review of 44 patients diagnosed with HIV infection was done. Treatment was at clinics (including prisons) in the Greater Vancouver catchment area between February 2015 and August 2017. Patients were evaluated with pre-and post-treatment elastography (Fibroscan, Ecosense, France). Fibrosis stages (I-IV) were defined using the nomogram provided by Ecosense. Clinical, laboratory, and demographic data were collected.

Results: There were 15 HIV/HCV co-infected patients. The mean age of co-infected patients was 51.3 years. All co-infected patients were on antiretroviral (ARV) treatment. 11 (73.3%) had viral loads <40 copies/mL and the mean CD4 count was 522. Of those, 12 (80%) were treated for their HCV with DAAs; 6 (50%) had post-treatment fibrosis

determination. Four patients (67%) demonstrated at least 1 stage of fibrosis regression.

Conclusion: Using elastography, we established significant fibrosis regression. It is notable that F4 (cirrhosis), may be dynamic. We consider whether the regression noted in this study is a true reflection of decrease in fibrosis, or if it may be confounded by other factors such as inflammation (transaminase levels). Further studies need to be done to clarify the correlation of post-treatment transient elastography scores with histopathology, and markers of inflammation. This study demonstrates the importance of treatment of HCV with DAAs in HIV co-infected population and its impact on fibrosis regression.

CSP3.05

Factors Associated with Non-alcoholic Hepatic Steatosis Among Hepatitis C (HCV) Monoinfected and HIV/HCV Co-infected Adults

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Background: Hepatic steatosis can be assessed non-invasively by controlled attenuation parameter (CAP) simultaneously with transient elastography (TE). We examined prevalence and factors associated with steatosis amongst individuals undergoing TE in an HCV referral clinic.

Methods: HCV-infected adults referred for TE between 10/2013 and 07/2015 were enrolled in a prospective cohort with baseline questionnaire and clinical assessment. The analysis includes participants with CAP scores and excludes those with non-infectious etiologies of liver disease or heavy alcohol use. Steatosis was categorized as present (S1-3) (CAP$\geq$248 dB/min) or absent (S0) (CAP $\leq$247 dB/min). For HIV+ participants, ART history was obtained from the BC-CfE Drug Treatment Program. Categorical variables were compared using Chi-squared or Fisher's exact test, and continuous variables using Wilcoxon rank sum test. Logistic regression modelling was used to examine factors associated with steatosis.

Results: Among 209 eligible participants, 164 (78.5%) were male, median age was 51 years, 144 (68.9%) were HIV/HCV co-infected, and steatosis was present in 102 (48.8%). Steatosis was not associated with gender, TE score, or HIV co-infection ($p>0.05$), but was associated with age, BMI, diabetes, and previous (pre-DAA) HCV treatment (see table). Among HIV co-infected participants, steatosis was associated with higher BMI ($p<0.001$), but not with duration of exposure to ART, older NRTIs, efavirenz, or protease inhibitors ($p>0.1$).

Results of logistic modelling of probability of steatosis (N=209)

Variable	Adjusted Odds Ratio	95% Confidence Interval
Age, per year	1.05	1.01-1.09
BMI, per kg/m^2	1.15	1.05-1.27
Diabetes (yes vs. no)	4.06	1.04-15.88
Previous HCV treatment (yes vs. no)	2.56	1.09-6.02

Conclusions: Hepatic steatosis was common (49%) in this HCV-infected cohort, and was associated with older age, higher BMI, diabetes, and receipt of older HCV treatment. Among HIV/HCV co-infected participants, steatosis was not associated with any specific ART agents or classes.

CSP3.06

On-treatment Factors Associated with Follow-up After Hepatitis C Treatment in Inner-city Community Health Clinics: A Prospective Cohort Study

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Background: People who inject drugs have high rates of HIV/HCV co-infection in the inner-city Downtown Eastside, Vancouver, British Columbia. Direct acting antivirals offer HCV cure, yet barriers to access and long-term engagement in care remain. We evaluated HCV treatment outcomes in a regional HCV care program integrated into primary care in the DTES, with a focus on loss-to-followup (LTFU) after therapy.

Methods: Individuals assessed for HCV therapy within three inner-city multidisciplinary primary care clinics September 2015 - June2017 were enrolled in a prospective cohort. Participants were recorded as achieving SVR12 if HCV RNA was negative or as LTFU if no HCV visit occurred within 10 weeks of SVR 12 due date. A logistic regression model assessed on-treatment factors associated with LTFU.

Results: Overall 135 Individuals were due for SVR 12 prior to June 1 2017 (76% male, median age 53 [q1-q3 47-60]). Amongst participants 7% had HIV/HCV co-infection and 53% received opioid agonist therapy (OAT). While on HCV treatment, 62% attended support groups, 35% had daily dispensing and 59% received their medication at the HCV clinic. 17% reported injection drug use in the last month of

treatment. SVR12 for those with results was 97%, however 24% were LTFU.

There was no association between LTFU and on-treatment group attendance (P=0.749), medication dispensing frequency (P=0.742) and dispensing location (P=0.820). Patients receiving OAT and HCV treatment at the same clinic were less likely to be LTFU (AOR=0.11 95% CI [0.03-0.45]). Participants who reported any injection drug use in the last month were more likely to be LTFU (AOR=5.64 95% CI [1.52-21.01]).

Conclusion: HCV treatment in the primary care setting by teams including family physicians is successful in inner-city populations. However, timely follow-up is challenging, especially for those with active IDU. Integrating OAT and HCV treatment in same location may assist with improved follow-up.

CSP3.07

The Association of Substance Use and Cirrhosis Measured by Transient Elastography (TE) in an HCV Monoinfected and HIV/HCV Co-infected Population

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Objectives: We sought to determine whether a history of substance use among HCV+ and HCV/HIV+ patients confers a greater risk of liver cirrhosis measured by TE.

Methods: HCV+ and HCV/HIV+ adults referred for TE were recruited from 2013-2015. Liver cirrhosis (F4) was defined as TE score ≥12.5kPa. Clinical and demographic data were collected by patient interview and HIV/ART-related factors from the BC Centre for Excellence in HIV/AIDS Drug Treatment Program. Categorical variables and continuous variables were compared using Chi-squared test or Fisher's exact test and Wilcoxon rank sum test, respectively. Multivariable logistic regression modelling was used to identify factors associated with cirrhosis. Level of significance set at $p<0.05$.

Results: The cohort comprised 298 HCV-infected adults: 79% male, median age 51 years [q1-q3: 46-58], 66% HCV/HIV co-infected, and 20% with cirrhosis. Median durations of HCV and HIV infection were 12 and 15 years, respectively. In bivariate analysis, current heroin use was associated with a greater risk of cirrhosis (p=0.007), but alcohol, marijuana, cocaine, crack and crystal meth were not; nor was HIV coinfection (p>0.10 for all). In multivariable modeling (Table 1), factors associated with fibrosis were current heroin use, older age, previous HCV treatment (pre-DAAs), and hepatitis B co-infection.

Table 1. Logistic modeling of the probability of F4 in the cohort

Variable	Adjusted OR	95% Confidence Interval
Current Heroin Use (current vs never)	8.87	2.70-29.12
Age at time of Fibroscan (per year)	1.06	1.02-1.11
HCV treated (yes vs no)	3.01	1.43-6.32
HepB co-infection (yes vs no)	3.44	1.32-8.95

Conclusion: Substance use among HCV+ and HCV/HIV+ patients in this cohort was not associated with greater risk of cirrhosis with the exception of current heroin use. Cirrhosis was independently associated with older age, receipt of pre-DAA HCV treatment, and hepatitis B co-infection.

CSP3.08

Decreased Hepatitis C (HCV) Treatment Uptake Among HIV-HCV Co-infected Patients with a History of Incarceration: a Call for Action

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Background: Rates of HIV and HCV are far higher in prison settings than in the general population; thus, treatment strategies must target this vulnerable group. We aimed to determine whether incarceration impacts HCV treatment uptake in the direct-acting antiviral (DAA) era.

Methods: We analysed data from the Canadian Co-infection Cohort, a prospective multicentre cohort of 1783 co-infected participants from 18 sites in Canada. HCV RNA+ participants who completed baseline information on incarceration were included and followed from November 21, 2013 (when second-generation DAAs were approved by Health Canada) until June 30, 2017. A Cox proportional hazards model was used to assess the effect of time-updated incarceration on time to treatment uptake, and was adjusted for patient-level characteristics known to be associated with treatment uptake in the DAA era.

Results: 965 HCV RNA+ participants were included; 72% had a history of incarceration. There were 280 second-generation DAA treatment initiations (96% with interferon-free regimens) during follow-up (15/100 person-years). Overall, 40% (105/262) of participants never incarcerated

were treated (23/100 person-years) compared to 25% (175/694) of previously incarcerated participants (12/100 person-years). Cure rates were 94% and 91%, respectively. Independent of other factors, participants with a history of incarceration (adjusted hazard ratio 0.71, 95% CI 0.53-0.95) were less likely to initiate treatment (Table).

Table: HCV treatment uptake during the DAA era

Variable	Adjusted Hazard Ratio (95% CI)
Time-updated incarceration status	0.71 (0.53 ; 0.95)
Age	1.01 (0.99 ; 1.02)
Female sex	0.9 (0.66 ; 1.21)
Indigenous ethnicity	0.73 (0.48 ; 1.13)
Monthly income ≤ 1500 CAD	0.62 (0.46 ; 0.85)
History of injection drug use (inactive)	0.9 (0.63 ; 1.28)
Active injection drug use	0.66 (0.43 ; 1.01)
Binge drinking at least monthly	0.92 (0.67 ; 1.27)
Undetectable HIV RNA (≤ 50 copies)	2.33 (1.63 ; 3.34)
Advanced liver fibrosis (APRI > 1.5)	1.57 (1.21 ; 2.05)
HCV genotype 3	0.77 (0.53 ; 1.11)
Psychiatric comorbidities	0.91 (0.71 ; 1.17)
Province (Reference BC)	
Saskatchewan	0.24 (0.1 ; 0.59)
Quebec	1.83 (1.3 ; 2.57)
Ontario, Alberta, or Nova Scotia	1.08 (0.76 ; 1.53)

Conclusions: People with a history of incarceration were significantly less likely to access treatment in the DAA era even after accounting for ethnicity, income and injection drug use. Increased efforts are needed to improve access to HCV treatment for previously incarcerated persons.

CSP3.09

Interventions to Improve Testing, Linkage to Care and Treatment of Hepatitis C Virus (HCV) Infection among People in Prisons: A Systematic Review

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Background: While the burden of chronic hepatitis C virus (HCV) infection is significantly higher among people in prisons compared to the general population, testing and treatment uptake remain suboptimal. The aim of this systematic review was to evaluate interventions to enhance HCV testing, linkage to care and treatment uptake among people in prisons, a key population for HCV elimination.

Methods: We searched Medline, Embase and the Cochrane Central Register of Controlled Trials for English language articles published between January 2007 and November 2017. Studies evaluating interventions to enhance HCV testing, linkage and treatment uptake for people in prison were included. Two independent reviewers evaluated articles selected for full-text review and extracted data for analysis. Disagreements were resolved by consensus.

Results: A total of 475 unique articles were identified, 29 were retrieved for full text review and six were included. All but one study focused on testing in prison settings. Only two were randomized controlled trials (RCTs); the remainder were primarily single arm uncontrolled trials. Interventions to enhance HCV testing in prison settings included combination risk-based and birth-cohort screening strategies, on-site nurse-led opt-in screening clinics with pre-test counseling and education, and systematic dried blood spot (DBS) testing. All interventions increased HCV testing, albeit risks for study biases were high. Only DBS interventions were evaluated using RCTs; one study showed increased HCV testing by 14.5%; the other showed no effect. Interventions to enhance linkage included facilitated referral for HCV assessment and scheduling of specialist appointments. All but one study was conducted in the pre-direct-acting antiviral (DAA) era; no studies were conducted in low- or middle-income countries.

Conclusions: While the majority of studies have focused on improving access to HCV testing in the interferon era, rigorous controlled studies evaluating interventions to improve testing, linkage and treatment uptake in the DAA era are necessary.

CSP3.10

Human Papillomavirus (HPV) Literacy and Perceived Cancer Risk among Women Living with HIV Receiving HIV Specialty Care

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Background: Women living with HIV are at higher risk for human papillomavirus (HPV)-associated cancers. Community investigator JL, working as an HPV literacy tutor with HIV-positive women's groups in Toronto and beyond, has found they have many questions regarding HPV and cancer prevention. We sought to quantify HPV knowledge and perceived risk among women living with HIV enrolled in the Ontario HIV Treatment Network Cohort Study (OCS) to inform continued educational outreach.

Methods: We used community-based research (CBR) approaches to develop a questionnaire on knowledge and attitudes regarding HPV, HPV-associated disease and prevention. We formed a Community Advisory Committee to review questions prior to implementation among female participants in the OCS during their annual interview. Primary objectives were to explore women's knowledge of HPV, their perceived risk for HPV-associated disease, and experiences with cervical cancer screening.

Preliminary Results: As of 10/2017, 73 women had completed the module; almost half (47%) were unfamiliar with HPV. Of those familiar with HPV, knowledge gaps remained: over a third of women did not know that some types of HPV cause genital warts, anal and some oral cancers (33%, 41% and 44%, respectively); 31% thought condoms prevented transmission and 41% thought HPV could be cured with medication. Still, 82% of women familiar with HPV knew people living with HIV were at increased risk for HPV-associated cancers. Overall, a large majority thought they had low or no chance of getting HPV, genital warts, or cervical, anal or oral cancers (66-84%). Forty-five percent of women had not participated in cervical screening within the last year despite the recommendation for annual screening.

Significance: These preliminary results highlight gaps in HPV knowledge among women living with HIV. This work will guide educational outreach and provide the groundwork for understanding the role of HPV literacy in improving uptake of prevention strategies.

CSP3.11

Differences in HCV Prevalence, Treatment Uptake, and Liver Related Events in Urban vs. Rural HIV/HCV Co-infected Residents of British Columbia

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Introduction: Direct acting antivirals (DAA) offer simple, safe, and effective treatments for hepatitis C virus (HCV). Individuals in rural and remote areas may have limited accessibility to treatments. We compared the prevalence of HCV, pre-DAA treatment uptake, and outcomes of patients with HIV/HCV in rural vs. urban areas.

Methods: Retrospective population data from the British Columbia Comparative Outcomes and Service Utilization Trends (COAST) study was used to capture all individuals with HCV between 1996–2013. HCV status was determined by serology in HIV/HCV individuals, and by ICD-9 code for HIV negative individuals. Rurality was determined by categorical postal codes. Prescriptions for interferon and ribavirin were identified from Provincial Pharmacare. Liver related events were defined using ICD-9 and hospital discharge codes.

Results: Overall 17,596 individuals with HCV were identified, including 18.2% from rural settings, and 49.4% people who inject drugs (PWID). HIV co-infection occurred in 4,283 (24.3%), of which 83.1% were PWID. Individuals with HIV/HCV were more likely to live in urban centers than those with HCV alone (86.4 vs. 54.2%, p<0.0001). Treatment uptake was higher in mono-infected vs. co-infected individuals in rural settings (25.1 vs. 9.7% p < 0.001). HCV treatment uptake in co-infection was low, but similar in urban vs. rural settings (380(10.3%) vs. 24(9.7%), p=0.7655). No urban vs. rural differences in end-stage liver disease (8.9 vs. 8.9%, p=0.9911) or liver related mortality (1.8 vs. 2.8%, p=0.2715) were observed with co-infection. Treatment uptake was less common in women (OR 0.62; 95% CI 0.49-0.80), PWID (0.69; 0.54-0.89), prior AIDS defining illness (0.63; 0.49-0.83), and viral load >40 copies/mL (0.17; 0.11-0.26). Rurality did not affect treatment uptake (0.94; 0.61-1.44).

Conclusions: Treatment uptake in co-infected individuals prior to DAAs was low, and was not affected by geographic location. Interventions to improve access to DAA therapy is required for HCV treatment scale up.

CSP3.12

Elevation of CD8 T-cell Counts and Serum Titers of CMV Antibodies During HIV Infection

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Introduction: We and others have previously showed that CD4/CD8 ratio and persistent elevation of CD8 T-cells contribute to disease progression and inflammaging. In order to better understand factors associated with CD8 elevation, we investigated the contribution of elevated titer of CMV-IgG antibodies in HIV infection.

Methods: A cross-sectional study was conducted among HIV-infected persons receiving care at Chronic Viral Illness Service of McGill University Health Centre, Montreal. Participants tested for CMV IgG were selected from the electronic database. Associations between CMV antibody

titers and age, sex, risk group, CD4 and CD8 T-cell counts and viral load were examined using appropriate statistical tests at 5% level of significance.

Results: A total of 1342 participants were analyzed. The median (IQR) age of participants was 41 (33; 50) years and the majority were male (73%), men who have sex with men (MSM) (47%) and with detectable viral load (61%) at the time of first CMV antibody testing. Participants presented with CD4 T-cell count of 344 (189; 511) cells/μL and CD8 T-cell count of 675 (473; 990) cells/μL. Among participants CMV IgG was detectable in 97% with 70% having a titer >250. Bivariate analyses showed MSM group was more likely to present with positive CMV IgG ($p<0.001$) test. Participants with CMV-IgG titers >250 were older in age (43 vs. 39; $p<0.001$) and had higher CD8 T-cell count (811 vs. 728; $p=0.009$). In addition, CMV IgG titers significantly correlated with CD8 T-cell count ($r=0.128$; $p=0.018$).

Conclusions: We confirm that elevation of CD8 T-cell counts is associated with CMV co-infection and shown for the first time that higher antibody titer is associated with a heightened elevation. MSM represents a group of persons with increased propensity for CMV-coinfection. Strategy aiming at controlling CMV-co infection and elevation of antibody titer may improve immune function in this population.

CSP3.13

"Everybody thinks someone else is taking care of it": Clinic Experiences Implementing Routine Syphilis Screening Among HIV-Positive Men

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Background: The Enhanced Syphilis Screening Among HIV-Positive Men (ESSAHM) trial used a cluster-randomized stepped wedge design at four hospital-based HIV clinics in Toronto and Ottawa to pair syphilis testing with routine viral load tests for all male HIV patients. Our process evaluation included interviews with providers and study personnel to identify facilitators and barriers to implementation of routine syphilis screening.

Methods: Purposive sampling was used to recruit site health care providers and clinic staff involved in the implementation of the intervention. Clinic observations and semi-structured qualitative interviews were conducted at each site. Interviews were audio-recorded, anonymized, transcribed verbatim and verified. We coded data by question and used an inductive analysis strategy.

Results: 25 participants consented to be interviewed (13 physicians, 9 nurses, 1 nurse practitioner and 2 research coordinators). Facilitators to implementation included nursing support and developing an automated screening process. Barriers included: challenges obtaining and deciphering syphilis test results, variation in clinician understanding of their role in the study, and differing perceptions among providers regarding utility of routine syphilis screening. For example, some providers were unaware of their role in obtaining participant consent and others were not aware of the study. Further, some providers indicated that clinical judgment should guide testing decisions, while others felt strongly that routine syphilis screening was already part of their practice, despite challenges implementing the trial. Most felt the intervention led to increased syphilis awareness, improved the number of syphilis cases identified, and was likely to be sustainable.

Conclusion: While most providers agreed with the premise of the intervention, implementing routine screening as part of an implementation trial resulted in a number of unforeseen challenges. These findings raise important considerations for future implementation studies in clinical settings.

Complications of Antiretroviral Therapy

Complications des thérapies antirétrovirales

CSP4.01

Development of a Pocket Card for Assessing Antiretroviral Therapy, Providing Seamless Care, and Preventing Medication Errors in Hospitalized HIV+ Patients

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Background: With advancements in therapy, HIV is now considered a chronic manageable disease; however, many HIV-positive individuals are hospitalized for acute illness or comorbid conditions. Due to the complexity of antiretroviral (ARV) therapy, the need for maintaining adherence to ARVs, and the fact that non-specialized clinicians are often unfamiliar with HIV management, high rates of ARV drug errors in this population have been reported in the literature.

Objective: The objective of this project was to develop an evidence-based ARV pocket card for hospital-based clinicians that addresses the common types of ARV errors reported.

Methods: The development of the pocket card involved: 1) Literature review of ARV drug errors in hospitalized patients. 2) Development of an in depth ARV guide for

electronic use. 3) Focus group consultation with provincial inpatient/corrections pharmacists on key elements to include in the pocket card. 4) A 6-week clinical pilot of the draft pocket card on several hospital units and in correctional facilities with higher HIV volumes. 5) A pilot survey to obtain feedback on the content and applicability of the card in practice. 6) Completion and distribution of the final version of the card.

Results: Feedback from the focus group (n=10) and pilot survey respondents (n=6) was very positive and provided guidance on card content and format. The final pocket card consisted of a patient assessment process addressing ARV considerations on admission, internal unit transfer, and discharge. Supplementary material included ARV drug information tables, specialized web links on ARV/HIV drug information, and HIV program contacts.

Conclusion: A pocket card for assessing ARVs in HIV-positive inpatients was developed and is available free of charge to health care providers. An electronic version is posted on-line. Further study is needed to evaluate the clinical utility of the guide and its impact on reducing drug-errors in this complex population.

CSP4.02

Comparison of Dipstick Urinalysis and Proteinuria/ Creatinine Ratios (P/CR) for Screening of Tenofovir Disoproxyl Fumarate (TDF) Related Tubular Toxicity

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Background: Guidelines differ on recommendations on screening for TDF-related tubular toxicity, all recommend eGFR; some with dipstick urinalysis (DUA) only and others with P/CR or urinary albumin/creatinine ratio (ACR) plus DUA.

Objectives: To evaluate the sensitivity and specificity of dipstick urinalysis for proteinuria when compared to P/CR and A/CR in patients receiving TDF.

Methods: Patients receiving TDF between 2012-2016 who underwent the concomitant testing of eGFR, DUA, P/CR and A/CR were included in the analyses at the exception of those with hypertension or diabetes. eGFR, DUA, P/CR and A/CR were measured in the CHUM laboratory hospital and entered on an electronic medical file. eGFR was calculated using CKD-EPI calculation. Urinary proteins, microalbuminuria and creatinine were measured on Siemens Advia 1800 system. DUA, was performed on Roche Urisys-2400.

Results: 580 patients receiving TDF were routinely screened every 3-12 months generating 2070 measurements of eGFR, DUA, P/CR and A/CR. eGFR was >90 in 1099 (53%) tests, between 60-90 in 868 (42%) and <60 in 103 (5%). DUA was positive for proteins in 174 tests (8%), P/CR was abnormal (>0.04 gr/mmol) in 181 (9%) and A/CR (>2 mg/mmol) in 598 (29%). Sensitivity to detect abnormal P/CR with urinalysis was 50%, specificity 96%. Sensitivity to detect abnormal A/CR with urinalysis was 24%, specificity 98%. The analysis conducted in subgroup defined by eGFR yielded to similar results when comparing proteinuria by DUA and P/CR.

Dipstick Urianalysis vs Gold Standard

test	Stratification	N	Sn	Sp	PPV	NPV	Youden' Indice (J): Sb+Sp-1
DUA vs Prot/ CR	None	2070	50%	96%	52%	95%	0.46
	Â Â Â Â Â Â Â eGFR â‰¥ 90	1099	36%	96%	30%	97%	0.32
	90 > eGFR â‰¥ 60	868	55%	97%	55%	95%	0.52
	60 > eGFR	103	54%	89%	81%	69%	0.43
DUA vs Alb/ CR	None	2070	23%	98%	82%	76%	0.21
	Â Â Â Â Â Â Â eGFR â‰¥ 90	1099	13%	97%	58%	79%	0.10
	90 > eGFR â‰¥ 60	868	28%	98%	86%	72%	0.26
	60 > eGFR	103	41%	98%	98%	41%	0.39

Sn: Sensitivity; Sp: Specificity; PPV: Positive Predictive Value; NPV: Negative Predictive Value

Conclusions: Urinalysis is a suboptimal tool to screen for tubular proteinuria that could be induced by TDF in all eGFR categories.

HIV and Aging and Comorbidities (including CVD, Osteoporosis, Neurocognitive Effects)

Le VIH, le vieillissement et les comorbidités

CSP8.01

Co-morbidities Among HIV-Infected Individuals

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Successful antiretroviral therapy allows most HIV-infected individuals to achieve a near-normal lifespan. As they age, a number of medical co-morbidities may emerge, and their type and prevalence may be influenced not only by chronic HIV infection, but also its mode of acquisition. There is little data to compare aging populations of HIV-infected people who inject drugs (PWID) and men who have sex with men (MSM).

A retrospective chart review (all active HIV-infected consenting patients as of 06/17) was used to identify risk factor for HIV acquisition, HCV co-infection status and to document clinical symptoms (ICD-9 classification). The primary analysis correlated the type and number of comorbidities as a function of HIV risk factor, with an emphasis on conditions needing specific medical intervention.

Key characteristics of the study population (n = 276) include: mean age 52.2 years, 9.1% female, 11.2% Indigenous, 60.9% PWID, 39.1% MSM, 59.4% HCV-infected, 23.9% on OST, 82.6% HIV plasma viral load <40 copies/ml, 59.4% CD4 >410 cells/mm^3. Only 8.9% had no comorbidities, and 54.3% had ≥ 3 comorbidities. PWID vs. MSM had significantly more comorbidities (3.3 vs. 2.5, p < .05). The factors associated (p <.05) with more than the median number of comorbidities was age > 56 years, current CD4 count < 200 cells/mm^3 and HCV coinfection. Acute STIs requiring antibiotic treatment occurred in 30.4% cases. The most common comorbidities were anxiety/depression (32.9%), COPD (24.6%), and hypertension (20.2%).

Among HIV-infected patients enrolled in long-term care, > 90% have a medical comorbidity requiring medical intervention, more frequently in PWID and older patients. One third have developed a new acute STI while engaged in HIV care. Models favoring less frequent follow-up in the setting of a long term response to antiretroviral therapy must consider the need for ongoing engagement to monitor for STIs and significant comorbidities requiring intervention.

CSP8.02

Comorbidity and Polypharmacy Among Women Living with HIV in British Columbia

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Introduction: With combined antiretroviral therapy (cART), HIV-positive persons are living longer. As a result, comorbid conditions and concomitant medication use are increasing, and have been described in several, mainly male cohorts. Understanding the burden of comorbid chronic diseases and associated treatments among women living with HIV (WLWH) is essential to care optimization.

Methods: We examined the prevalence of comorbid chronic diseases as well as concomitant medications (in addition to cART) and vitamin (vitamin D, B12, Iron, Calcium) use among WLWH and HIV-negative women aged ≥19 years, enrolled in the CARMA (Children and Women: AntiRetrovirals and Markers of Aging) cohort. Diagnoses and medication/vitamin information were obtained prospectively through self-report. Number of diagnoses, medications and vitamins were compared between groups using Mann-Whitney U Test, while differences in diagnosis were compared using Fisher's exact test.

Results: WLWH (N=267) were younger than HIV-negative women (N=276) (mean±SD 40.2±10.1 vs. 43.1±13.1 years, p=0.004), and had significantly more comorbidities (not including HIV) (2.4 vs. 1.6 diagnoses/person respectively, p<0.00001). Among diagnoses, depression/anxiety (p=0.0003), recurrent HSV (p=0.0001), GERD/peptic ulcer disease (p=0.013), osteoporosis/osteopenia (p=0.0001) and B12 deficiency (p=0.0001) were more frequent in WLWH. With non-cART medications and vitamins combined, WLWH took more than HIV-negative women (2.4 and 1.9 medications and vitamins/person respectively, p=0.03). When separated, number of non-cART medications were similar in WLWH and HIV-negative women (1.6 and 1.3 medications/person respectively, p=0.33), however WLWH took more vitamins (0.8 vs. 0.6 vitamins/person respectively, p=0.04).

Conclusion: Despite being younger, WLWH have more comorbid illness when compared with HIV-negative peers. The difference between groups for osteoporosis/osteopenia could be elevated due to increased screening in WLWH. This analysis provides insight into the burden of comorbid illness and its treatment among a relatively young cohort of WLWH in British Columbia. Further investigation is needed to determine if WLWH are receiving appropriate treatment for comorbidities.

CSP8.03

Response to Initial Combined Antiretroviral Therapy (cART) Amongst Older People Living with HIV in the Canadian Observational Cohort (CANOC)

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Background: Increased numbers of older people are diagnosed with HIV. Controversies exist as to whether these patients' response to cART is as robust as their younger counterparts.

Methods: We conducted retrospective analyses of CANOC data from January 1, 2000 to December 31 2014 comparing CD4 and virologic response to treatment across age.

Participants were cART naïve and had ≥1 viral load and CD4 within 1 year prior to cART. Primary outcomes were CD4 change from baseline and absolute CD4 response using linear mixed models. Secondary outcomes included time to viral suppression and viral rebound using Fine and Gray models with death as a competing risk.

Results: 10,438 participants were included. The 1812 participants ≥50 years of age were more frequently male (87.2% vs. 80.6%), Caucasian (40.0% vs. 34.5%), and initiated boosted PIs (43.0% vs. 39.6%) or integrase inhibitors (7.6% vs. 5.9%), while less commonly IDU (18.6% vs. 22.1%) and MSM (40.6% vs. 45.9%). Older participants had lower baseline CD4 (219 vs. 237 cells/mm^3). After adjusting for baseline CD4 and covariates (including demographics, calendar start year, and initial cART regimen), older age (per 10 years) was associated with slightly lower CD4 change from baseline (β=-3.44 cells/mm^3, 95% CI:-5.67,-1.22 cells/mm^3) and absolute CD4 response (β=-4.15 cells/mm^3, 95% CI:-6.60,-1.69 cells/mm^3). Viral suppression occurred in 8,986 participants (87.8%) with 1,493 (16.6%) experiencing rebound. The median time to viral suppression was 154 days. In adjusted models, older age (per 10 years) was associated with increased likelihood of suppression (HR=1.05, 95% CI:1.02,1.07) and decreased likelihood of rebound (HR=0.80, 95% CI:0.76,0.85).

Conclusion: Despite being more likely to achieve virologic suppression and less likely to rebound, older age (per 10 year) was not associated with a clinically relevant blunted CD4 change from baseline and absolute CD4 response following first line cART.

CSP8.04

The Relationship Between Aging, Frailty, Multimorbidity, and the Development and Progression of HIV-Associated Neurocognitive Disorder (HAND)

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Background: Frailty is a concept that is increasingly considered in the context of aging with HIV. Frailty describes the variability in age-related health problems that arise from deterioration in various physiological systems. The objective of this study was to determine the relationship between frailty and the development and progression of HAND.

Methods: We used data from the Ontario HIV Treatment Network (OHTN) Cohort Study (OCS). At baseline 45.8% (n=528) of participants were neuropsychologically normal, 35.1% (n=404) had asymptomatic neurocognitive impairment, 14.8 (n = 171) had mild neurocognitive disorder, and 4.3% (n=49) were diagnosed with HIV-associated dementia. Neuropsychological testing was done annually. HAND status was assigned according to Antinori et al. (2007) criteria. Frailty scores were categorized as 0 - 0.1, 0.1 - 0.2, 0.2 - 0.3, and 0.3+. Cox Proportional Hazards models were used to determine the association between frailty and the development of HAND. Transition matrices allowed for the calculation of a mobility measure to estimate progression between HAND states.

Results: A total of 60 variables were included in the frailty index (FI). 1152 OCS participants provided 3496 study visits. FI scores at baseline ranged from 0.00 to 0.51 with a mean of 0.22 (SD= 0.10) and were normally distributed. Higher FI scores were associated with an increased risk of development of HAND (HR 2.68; 95% CI 1.22 – 5.88; p=0.014). The Means Bartholomew (M) matrix-based mobility measure demonstrated that participants with an FI score of 0.1 to 0.3 had higher mobility (M=0.012 and M=0.013, respectively) than those with lower FI scores (M=0.0065) and those with FI scores above 0.3+ (M=0.011).

Conclusions: The frailty index was useful in predicting the development of HAND and the mobility between various HAND states. Measuring frailty could serve as a useful clinical intervention to decrease the risk of development and progression of HAND.

CSP8.05

Application of the Guidelines for Monitoring Nonalcoholic Fatty Liver Disease in HIV Mono-infected Patients: Insights from the LIVEHIV Cohort

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Background: Nonalcoholic fatty liver disease (NAFLD) is the most frequent hepatic disease in Western countries. People living with HIV are at higher risk of NAFLD than the general population. Recent guidelines from the European Association for the Study of the Liver (EASL) recommend using a diagnostic algorithm, to assess and monitor NAFLD in HIV-negative populations by screening for fatty liver and assessing ALT and the non-invasive fibrosis biomarker (FIB-4). We aimed to estimate and characterize HIV patients at risk for NAFLD and progressive liver disease from a large cohort using the EASL guidelines.

Methods: This was a cross-sectional analysis of patients recruited to the prospective LIVEHIV Cohort study, a routine screening program for NAFLD in HIV-infected persons running at our centre. Patients with significant alcohol intake and HCV/HIV co-infected were excluded. NAFLD screening was performed using Fibroscan with associated controlled attenuation parameter (CAP). NAFLD was defined as CAP ≥248 dB/m, while significant liver fibrosis was diagnosed as FIB-4 >2.67. Risk of progressive liver disease was defined as having NAFLD with either elevated ALT or significant liver

fibrosis. Logistic regression analysis was used to identify predictors of progressive liver disease.

Results: We included 617 mono-infected patients (mean age 50, 75% males). We found that 209 cases (33.8%) had NAFLD and 132 (21.4%) were at risk of progressive liver disease and should be referred for a hepatology consultation. After adjusting for BMI, duration of HIV infection, hypertension, CD4 cell count and exposure to protease inhibitors, male gender (aOR 2.49, 95% CI 1.01-6.28) and diabetes (aOR 1.86, 95% CI 1.01-3.45) were independent predictors of risk of progressive liver disease requiring specialist referral.

Conclusions: According to current NAFLD guidelines, a significant proportion of HIV mono-infected patients is at risk for progressive liver disease which requires dedicated monitoring and referral to specialized care in hepatology.

CSP8.06

Wireless Physical Activity Monitor Use Among People Living with HIV: A Scoping Review

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Introduction: Physical activity (PA) can help to promote healthy aging while addressing health-related challenges experienced by people living with HIV (PLWH). Wireless physical activity monitors (WPAMs) are increasingly used for measuring PA, however evidence of their use among PLWH is unclear. Our aim was to characterize the evidence pertaining to WPAMs in the context of HIV.

Methods: We conducted a scoping review using the Arksey and O'Malley Framework. We asked: what is the nature and extent of evidence pertaining to WPAM use among PLWH? We searched databases including MEDLINE, EMBASE, PubMed for articles pertaining to WPAM and HIV. Two reviewers independently screened abstracts for articles that met the following inclusion criteria: used WPAM(s) with adults (≥18 years) living with HIV, and published 1980 onwards. We extracted data onto a piloted standardized data extraction form including characteristics of studies, WPAMs, and participants. We collated results to describe characteristics of the included articles, reporting on type and how WPAMs were used.

Results: Our search strategy yielded 1013 citations, of which 44 articles were included in the review (42 research studies; 2 review articles). Of the 47 WPAMs mentioned in the 44 included articles, most frequently used were Actigraphs (60%; n=28), Accelerometers (21%; n=10), and Pedometers (19%; n=9). Among the 42 included studies (n=2407 PLWH; 44% women). The most frequent study design was cross-sectional studies (50%; n=21) that used WPAMs to measure sleep (48%;10/21) or PA (43%;9/21). One randomized-controlled trial assessed the effectiveness of WPAMs for enhancing PA. Three (7%) studies assessed measurement properties of WPAMs among PLWH.

Conclusion: Evidence of WPAMs in the context of HIV primarily involved WPAMs as a measure of PA and sleep. Future research should assess the reliability and validity of WPAMs among PLWH, and identify the effectiveness of WPAMs as a mechanism to promote PA among PLWH.

CSP8.07

HIV as Risk Factor for Polypharmacy: Data from the Canadian HIV and Aging Cohort

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Background: As the population living with HIV ages, polypharmacy with drugs other than antiretrovirals is becoming an increasing concern. We aimed to describe non-antiretroviral drug use in a large cohort.

Methods: The Canadian HIV and Aging cohort study (CHACS) recruits people living with HIV over 40 years of age, and population controls, in 11 clinical sites across Canada. Comprehensive medical and pharmaceutical history is collected at baseline and during follow-up. We compared use of several non-HIV specific prescription drugs. Proportions were compared using chi-square or Fisher's exact tests.

Results: CHACS actively follows 782 people living with HIV and 217 controls. Mean age (55) was similar in both groups. People living with HIV were more likely to be males (87%) than controls (78%), p<0.001. At cohort enrollment, patients living with HIV were more likely to report use of psychoactive drugs such as benzodiazepines (18 vs. 5%, p<0.001), antidepressants or antipsychotics (20 vs. 14%, p=0.045). They were also more likely to use antiplatelet drugs (10 vs. 5%, p=0.015), statins (21 vs. 13%, p=0.016), proton pump inhibitors (16 vs. 8%, p=0.006), bisphosphonates (5 vs. 1%, p=0.008) and testosterone replacement therapy (males, 12 vs. 2%, p<0.001). Prescribed opioids, methadone, glucose-lowering therapy and anti-hypertensive use was similar in both groups. The proportion of patients taking at least 1, 2 or more than 3 of the studied

drugs were 17, 16, and 22% in the HIV group, compared to 13, 13, and 9% in the control group, respectively (p<0.001).

Conclusion: People living with HIV enrolled in CHACS take more non-HIV related prescription drugs than their HIV negative counterparts. While this can reflect increased prevalence and awareness of chronic diseases for this population, polypharmacy carries health risks and must be carefully monitored.

CSP8.08

Epicardial Fat is Increased in the HIV Population and Associated to Coronary Plaque Burden

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Introduction: HIV patients live longer and are increasingly subject to age-related disease especially coronary artery disease (CAD). Epicardial fat has emerged as an adipose depot of interest, potentially involved in the pathogenesis of CAD, due to its key localization, its metabolic properties and clinical measurability. We hypothesize that epicardial fat volume is increased in the HIV patients and correlated with total coronary plaque volume, and especially with low attenuation plaque volume, which is a marker of plaque vulnerability.

Methods and Materials: This is a cross-sectional study, nested in the Canadian HIV and Aging Cohort Study (CHACS), a large prospective cohort actively following more than 800 HIV+ and HIV- patients. Consecutive CHACS participants with low to intermediate cardiovascular risk without symptoms or past CAD were invited to undergo cardiac computed tomography (CT) and coronary plaque imaging with CT angiography. Volume measurements of epicardial fat, total atherosclerotic plaque and low-attenuation atherosclerotic plaque were performed.

Results: A total of 246 participants underwent cardiac CT scans. 173 were HIV+ and 73 were HIV-. HIV+ patients had greater epicardial fat volume indexed to Body mass index (BMI) than HIV- patients ($p = 0.03$). In the HIV infected group, epicardial fat volume was associated with duration of antiretroviral therapy use ($\beta = 1.45$, $p = 0.004$). After adjustment for traditional cardiovascular risk factors, including BMI and waist circumference, epicardial fat volume was significantly associated with total plaque volume ($\beta = 1.99$, $p = 0.04$) and low attenuation plaque volume ($\beta = 0.86$, $p = 0.01$).

Conclusion: HIV patients had greater amount of epicardial fat than HIV uninfected patients. The association of epicardial fat volume with antiretroviral therapy duration and subclinical coronary artery plaque may suggest a potential mechanism that could explain the increased risk for CAD in the HIV population.

CSP8.09

The Development of an Updated Tool for Preventing and Managing Bone Disease in HIV-infected Adults

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Objective: As HIV+ patients age, numerous chronic comorbidities are emerging including bone disease. HIV clinicians are faced with managing a variety of conditions that require additional knowledge and skills. The objective is to describe the development of an updated version of a practical tool to assist clinicians in preventing and managing bone disease in this population.

Methods: Based on positive feed-back and use of the initial 2012 tool in practice, an updated 2017 version was developed. The tool was developed by a group of three pharmacists with expertise in HIV and osteoporosis. The content was based on published literature, HIV conference abstracts, osteoporosis guidelines and expert consultation with an HIV endocrinologist and dietitian. The tool was then reviewed for content, readability and applicability by several Canadian HIV pharmacists. The final tool was published in pocket card format, posted electronically and available nationally for order free of charge.

Results: The tool has four main sections: 1) Risk Factors for Fractures and Bone Loss: includes a concise table with key factors that predispose HIV+ patients to bone loss or fractures. 2) Patient Assessment: includes recommendations on initial screening, indications for bone mineral density testing, fracture risk assessment and diagnostic work-up. 3) Treatment of Osteoporosis: outlines which patients are candidates for treatment of osteoporosis based on risk assessment and suggests treatment options, including drugs to treat osteoporosis, risk reduction strategies and monitoring of therapy. 4) Prevention: summarizes general and pharmacologic preventative measures.

Conclusions: A clinical tool for the prevention and treatment of bone disease in HIV was developed by a group of expert pharmacists to provide practical guidance for clinicians and to standardize an approach to patient care. Further study is needed to evaluate the clinical utility of the tool and impact on prevention and detection of osteoporosis and disease management in HIV.

CSP8.10

Canadian HIV Practice Reflective Initiative to Improve Management of Patients with Comorbidities

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Background: The average age of persons living with HIV (PLWHIV) is increasing. The management of medical comorbidities in PLWHIV is of growing concern, as PLWHIV have higher rates of comorbidities than their age matched non-HIV infected peers. Here we aim to characterize prevalence and risk of developing medical comorbidities in PLWHIV in Canada.

Methods: This is a multi-centre, retrospective study including five HIV clinics from British Columbia, Saskatchewan, Ontario and Quebec. Through electronic chart reviews, data were anonymously collected on demographics, lifestyle, disease diagnosis, comorbidities, current drug therapy and lab results from the most recently seen 200 HIV-positive patients at each clinic. Renal and cardiovascular disease risk scores were calculated using D:A:D and Framingham risk equations. Aggregate data of the five sites are presented here.

Results: In this cohort of 1000 Canadian PLWHIV, the majority of patients were ≥50 years old (59%), with 24% being older than 60. There was a high level of comorbidities in the population studied (mean 2.73; 74% of patients had ≥2 comorbidities, with 30% ≥4 comorbidities), with common comorbidities being associated with renal (18%), bone (24%), hypertension (24%), dyslipidemia (37%), obesity (43%), liver (50%) and central nervous system (53%) disease. Renal risk score by D:A:D algorithm showed 69% of PLWHIV having a high renal risk score, while 48% had medium or high cardiovascular risk score based on Framingham and D:A:D equations. Bone mineral density was measured in a subset of study participants only (20%), and of those, 58% were in osteopenic and 13% in osteoporotic range.

Conclusions: The Canadian cohort of PLWHIV is aging, with a large majority of patients having high rates of comorbidities and increased risk of developing chronic kidney disease and cardiovascular disease. Routine assessment and management of comorbidities in PLWHIV should be encouraged as part of routine HIV care in Canada.

CSP8.11

Assessment of Adults Living with HIV (PLHIV) and Neurocognitive Symptoms

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Background: Neurocognitive symptoms are common among ART-treated adults and can affect quality of life. We examined neurocognitive function among PLHIV undergoing assessment in a neurology referral clinic.

Methods: The prospective cohort enrolled PLHIV (aged ≥19 years) with cognitive complaints not readily explained by another diagnosis (e.g. cerebral trauma, stroke), who underwent comprehensive evaluation by a neurologist, including history of comorbid conditions and substance use, neurological examination, cognitive screening tests, head MRI, lumbar puncture if clinically indicated, and blood and CSF analysis . Neurocognitive function was categorized by a neuropsychologist as normal for age, mild neurocognitive disorder (MND), or dementia. Categorical variables were compared using Cochran-Mantel-Haenszel Mean Score test and continuous variables using Kruskal-Wallis test.

Table: Baseline Characteristics of the Cohort (n=60)

	Normal for age	MND	Dementia
N	**14**	**40**	**6**
Male gender, N (%)	14 (100%)	38 (95%)	5 (83%)
Age in years, median (IQR)	53 (49-59)	52 (47-58)	55 (48-62)
Years since HIV diagnosis, median (IQR)	10 (6-21)	8 (4-17)	5 (5-25)
CD4 nadir, cells/mm_3, median (IQR)	160 (90-260)	130 (60-180)	125 (40-210)
CD4 current, cells/mm^3, median (IQR)	500 (420-710)	460 (285-620)	580 (530-670)
On ART, N (%)	14 (100%)	37 (92%)	5 (83%)
plasma viral load <50 copies/mL, N/N (%)	13/14 (93%)	31/40 (78%)	5/5 (100%)
CSF viral load <40 copies/mL, N/N (%)	4/5 (80%)	19/22 (86%)	4/4 (100%)
MoCA <25, N (%)*	6 (43%)	23 (64%)	6 (100%)
HDS <10, N (%)*	0 (0%)	10 (29%)	5 (83%)
HDS <14, N (%)*	2 (14%)	26 (74%)	6 (100%)
*between-group difference p<0.05			

Results: Of 82 participants enrolled between 07/2010 and 11/2014, neurocognitive category was not available in 22 (due to language or psychiatric issues, missed appointments, or missing data). Among 60 evaluable participants, 14 (23%) had normal neurocognitive function for their age, 40 (67%) had MND, and 6 (10%) had dementia. Viral load

was undetectable in plasma in 49/59 (83%), and in CSF in 27/31 (87%). The three groups differed with respect to MoCA and HDS scores, as expected, but not with respect to any other parameters (see Table), including BMI; smoking status; C-reactive protein; apolipoprotein B; MRI white matter scores; or CSF beta amyloid, t-tau, or p-tau (p>0.05).

Conclusions: Among PLHIV with neurocognitive complaints, nearly one-quarter had normal neurocognitive function for their age. These data highlight the value of a comprehensive assessment in PLHIV experiencing cognitive symptoms.

CSP8.12

Alignment of HIV Care Delivery in Canada with the Chronic Care Model (CCM)

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Background: For people living with HIV using continuous antiretroviral therapy, HIV is now a complex and episodic chronic condition. The Chronic Care Model (CCM) is a framework that provides an integrated approach to the delivery of care for people with chronic conditions that might in turn be applied to the delivery of care for people living with HIV.

Methods: We conducted semi-structured interviews with key informants from 12 HIV care settings located in five Canadian provinces. Settings were eligible to participate if they provided specialty or primary care services to a substantial number of people living with HIV. We assessed the alignment of the HIV care settings with the six components of the CCM: organization of healthcare, self-management support, delivery system design, decision support, clinical information systems, and community resources and policies.

Results: The services provided by Canadian HIV care settings are aligned with several components of the CCM, most prominently in the areas of linkage to community resources and inter-professional team based care. Support for patient self-management consisted of group-based counseling or health education programs, but was not available in all settings. We found that the organization and leadership of healthcare systems could be a challenge for settings located in large hospitals when administrative structures did not appreciate the unique needs and care requirements of people living with HIV. Some participants further reported gaps in the availability of clinical information systems in their settings, which would help them to better understand their patient population and to optimize care through quality improvement.

Conclusion: Irrespective of composition of the care setting or its location, HIV care in Canada is well aligned with several components of the CCM. We propose the need for improvements in certain components to achieve better care delivery and health outcomes among people living with HIV in Canada.

CSP8.13

Metabolic and Cardiovascular Health Among Women Living with HIV Enrolled in the CARMA Cohort

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Introduction: Combination antiretroviral therapy (cART) has improved the lifespan of persons living with HIV (PLWH). However, data suggest early comorbidities of aging in treated PLWH. Cardiovascular and metabolic diseases are more common among PLWH, possibly due to elevated inflammation and/or cART-related toxicity. Since past studies have primarily focused on men, data are limited on age-related comorbidities among women living with HIV (WLWH). Herein, we investigate the prevalence of cardiovascular and metabolic abnormalities among WLWH and HIV-negative female participants of the CARMA (Children and Women: AntiRetrovirals and Markers of Aging) cohort.

Methods: We conducted a prospective study of non-pregnant WLWH (N=155), and HIV-negative (N=133) women and female youth (age ≥ 12 years) enrolled in CARMA. Prevalence of hypertension, diabetes, dyslipidemia, and metabolic syndrome was determined through a combination of self-report (medical history, medication profile), anthropometric, chart review, and laboratory data. Diagnoses were based on current Canadian guidelines/definitions. Statistical analyses were performed using Chi-Square or Student's t-tests where appropriate.

Results: WLWH and HIV-negative controls were of similar age (mean±SD 43±13 vs. 43±14 years, respectively), with comparable body mass index (BMI) (mean±SD 26.8±7.1 vs. 26.2±6.5 kg/m^2). Univariate analyses revealed that WLWH had more dyslipidemia than HIV-negative women (63% vs. 40% respectively, p=0.001), higher Framingham risk scores (mean±SD 4.9±5.6 vs. 3.7±3.8, p=0.04), and were more likely to be smokers (38% vs. 12%, p=0.0001). Similar rates of hypertension (15% vs. 10%, p=0.16), diabetes (6% vs. 4%, p=0.58), and metabolic syndrome (28% vs. 21%, p=0.22) were seen between WLWH and HIV-negative women, respectively.

Conclusion: Despite a relatively young age, almost two-thirds of WLWH had dyslipidemia, significantly more than their HIV-negative peers. Strategies to improve dyslipidemia and decrease smoking rates may improve long-term prognosis and cardiac risk among aging WLWH. Further

studies investigating the associations between metabolic and cardiovascular health, cART, and cellular aging are ongoing.

CSP8.14

HIV-Infected Persons with Liver Disease Receive Inadequate Screening for Esophageal Varices: Prospective Application of the Baveno Vi Guidelines in 1,510 Cases

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Background: HIV positive (HIV+) people are at increased risk of developing cirrhosis and its complications, including variceal hemorrhage. The Baveno VI consensus provides guidance as to which patients should be screened for esophageal varices, and which can safely forego esophagogastroduodenoscopy (EGD), based on transient elastography (TE) and platelets. We aimed to determine whether Baveno VI consensus guidelines are appropriately applied in HIV+ as compared to HIV negative (HIV-) individuals with liver disease.

Methods: We prospectively included patients who underwent routine TE. Baveno VI guidelines (TE measurement <20kPa and platelets >150,000) were applied to identify those at low risk of having varices, and who could avoid screening EGD. Logistic regression analysis was used to investigate independent predictors of deviation from the Baveno VI guidelines. Diagnostic accuracy of Baveno VI guidelines as compared to perform universal EGD (gold standard) was computed.

Results: 725 HIV+ (21% HIV/HCV co-infected) and 785 HIV- patients (38% with hepatitis C) were included. 79% HIV+ and 74% HIV- patients met the Baveno VI guidelines for not requiring screening EGD. In the remaining cases who required screening, EGD was performed in only 23% of HIV+ as compared to 87% of HIV- patients (p<0.001). Incidence of variceal bleeding was higher in HIV+ than HIV- patients (5.8% vs 1.9%, p<0.05). In HIV+ patients, the Baveno VI guidelines had 0.82 sensitivity and 0.62 specificity to diagnose esophageal varices as compared to universal EGD, which were similar to HIV- patients. After adjustment for age, gender, BMI and anti-HCV positivity, being HIV+ was the strongest independent predictor of deviation from the Baveno VI guidelines (aOR=10.0, 95% CI 7.5-13.5; p<0.0001).

Conclusions: Despite the Baveno VI guidelines performing well in HIV+ cases, these patients receive less standard of care screening for esophageal varices than HIV- patients, placing them at higher risk of fatal complications from hemorrhage

CSP8.15

Outcomes of Atrial Fibrillation (AF) in People Living with Human Immunodeficiency Virus (PLHIV) in British Columbia, Canada

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Background: Our group's previous data showed PLHIV developed AF 10 years earlier than HIV-negative individuals (HIV-neg) but incidence rates were similar. We sought to compare associated conditions, treatment and outcomes of AF in PLHIV with HIV-neg.

Methods: The Comparative Outcomes and Service Utilization Trends (COAST) study, a population-based cohort of PLHIV and a 10% general population sample aged ≥19 years, contains clinical and administrative health data from the BC Centre for Excellence in HIV/AIDS and Population Data BC. We used ICD-9/10 codes to identify AF diagnosis and outcomes [comorbidities, transient ischemic attack (TIA) and stroke], from 1996 to 2013. Age-adjusted incidence rates were calculated using the age distribution of 2011 Canadian standard population.

Results: Among 20,276 individuals (PLHIV:212; HIV-neg:20,064) with AF, PLHIV had higher substance and alcohol use (48% vs. 10%, p<0.001) while HIV-neg had more hypertension (74% vs. 58%, p<0.001) and ischemic heart disease (60% vs. 45%, p<0.001).

PLHIV with AF received less oral anticoagulation (45% vs. 56%, p=0.002), warfarin being the main agent (42% vs 52%, p=0.004). Table 1 shows incidence rates of stroke, TIA and mortality per 100 Person-Years (%PY) for both populations. Among men aged 19-49, PLHIV had higher stroke (72.15%PY vs. 5.48%PY) and mortality rates (8.25%PY vs. 1.19%PY; rate ratio: 6.93, 95% CI: 3.52–13.65).

Table 1. Age-adjusted Incidence Rates of TIA, Stroke (for male) and All-Cause Mortality of AF per 100 Person-Years (95% CI)

	PLHIV (n=212)	HIV-negative individuals (n=20,064)	PLHIV vs. HIV-negative individuals Rate Ratio
TIA	1.33 (0.44-2.23)	1.32 (1.17-1.48)	1.01 (0.33-1.69)
Stroke	48.50 (44.22-52.79)	12.98 (12.53-13.43)	3.74 (3.41-4.07)
All-cause Mortality	9.48 (7.26-11.70)	3.48 (3.30-3.65)	2.73 (2.09-3.37)

Conclusions: PLHIV with AF had less traditional underlying conditions for AF and oral anticoagulants utilization compared to HIV-neg. Stroke and mortality rates were higher

in PLHIV, particularly among younger men. Early diagnosis and treatment of AF should be considered for PLHIV.

HIV in Children and Adolescents

Le VIH chez les enfants et les adolescents

CSP5.01

90/90/90? How are Canadian Infants and Children Measuring Up to UNAIDS Targets for 2020?

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Background: The objective of this study was to determine how HIV exposed and infected children in Canada measure up to UNAIDS 90/90/90 targets for 2020, and what, if any, are the impediments to achieving each of the three "90" objectives for children in our resource-rich setting.

Methods: Using WHO criteria for early infant diagnosis, the proportion of Canadian born HIV-exposed infants with two or more diagnostic tests between 1 and 6 months of age was determined from the Canadian Perinatal HIV Surveillance Program (CPHSP) database. The proportion of HIV-infected children receiving antiretroviral therapy (ART) and with virologic suppression were determined using information from the CPHSP and Early Pediatric Initiation of Combination Antiretroviral Therapy Canada Child Cohort (EPIC[4]).

Results: From 2007-2015, 88% (1435/1624) of all HIV-exposed infants born in Canada had confirmatory testing by 6 months of age. Of the 33 children confirmed to be infected during this time period however, only 23 (70.4%) were diagnosed by 6 months of age. Median age at diagnosis for the remaining 10 children was 16 months (IQR 10-33 months). Of 201 children enrolled in the EPIC[4] cohort, 89% were on ART. There was no difference in ART coverage according to family income, immigration status, or age (0-12 vs. >12). These children represented 69% of all HIV infected children in Canada, as registered with the CP-SHP. Assuming that those not enrolled in the EPIC[4] cohort were less likely to be on treatment (25-85% ART coverage), the overall estimate for ART coverage among all Canadian could range from 60-88%. Of those children on ART, 91% had virologic suppression.

Conclusion: s: These data suggest that while the 90/90/90 targets are close to being met for Canadian children living with HIV, delayed diagnosis among perinatally infected Canadian born children remains an issue adversely impacting ART uptake.

CSP5.02

Video Directly Observed Therapy to Improve Adherence to Combination Anti-retroviral Therapy in HIV Infected Adolescents: A Pilot Study

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Introduction: Poor adherence to antiretroviral therapy (ART) is a major problem in adolescents living with HIV. We conducted a pilot study evaluating the feasibility and acceptability of using video directly observed therapy (VDOT) as a method of improving medication adherence in poorly-adherent adolescents.

Methods: HIV infected adolescents with a history of poor adherence to ART were eligible for inclusion. The study consisted of four phases: VDOT daily (4 months), daily texting (2 months), weekly texting (3 months) and no intervention (3 months). Monthly clinic assessments were scheduled. Study is ongoing.

Results: Five of 8 eligible subjects consented to participate (median age 17 years (16-19); 3 male, 2 female). All were perinatally infected and had dual (n=4) or triple class (n=1) resistance. Four were on drug holidays for 5-9 months pre-enrollment. Median baseline viral load and CD4 count were 6,342 copies/mL (82-34,657) and 218 cells/µL (72-265), respectively. Three participants (2 in weekly-texting phase; 1 in daily texting phase) achieved and maintained viral suppression. One participant achieved viral suppression but missed 3 consecutive appointments (in daily texting phase). One participant was withdrawn from the study during daily texting phase due to protocol non-compliance. During the VDOT phase, the proportion of doses observed taken per-participant ranged from 42-98% (n=5). For the daily texting phase, text responses indicating medication taken were received for 96.7%, 85.2% and 44.4% of doses (n=3). Two subjects fully complied with monthly pill count requirements – this showed 100% and 93% of pills taken (first three phases combined). Participants expressed general satisfaction with the intervention. Healthcare providers felt the intervention was at times burdensome.

Conclusion: VDOT is feasible and acceptable as an intervention to both adolescents living with HIV and care providers to improve adherence in select populations. Barriers to success include variable compliance and time burden for service providers.

HIV in Vulnerable Populations and Global Health Issues

Le VIH dans les populations vulnérables et les enjeux sanitaires mondiaux

CSP9.01

Cascade of Care of HIV Infected Patients in Community and Correctional Services Settings in British Columbia

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Introduction: Challenges in the management of HIV, especially in vulnerable populations, such as prison settings include concurrent psychosocial disorders, and high prevalence of HCV co-infections, as well as continuation of care on discharge from correctional institutions. An estimated 20-30% of HIV infected individuals in Canada are co-infected with HCV infection. Interferon based HCV treatment regimens precluded many from being treated. Currently administered direct acting HCV regiments are more tolerable and effective. The aim of this study was to describe the cascade of HIV and HIV/HCV care in patients in community and prison settings in British Columbia.

Methods: Retrospective chart review of HIV-infected patients seen at a community based clinic of the and prison settings of Greater Vancouver from February 2015 to August 2017 was done to evaluate the HIV treatment outcomes in addition to sustained virologic response (SVR) rates of HCV infection. Some patients started care in prison and were linked to community clinics on discharge. Others started in the community and continued care in the prisons. There was a continuum of care with their same infectious diseases healthcare provider.

Results: Of 44 HIV infected identified, 35 (79.5%) were males, 9 (20.5%) females; mean age 51.2 years. Forty-two (95%) were on ARVs, 38 (86.4%) had viral loads <40 copies/mL, mean CD4 was 554(Range: 140-1080). 15 of 44 (34%) were co-infected with HCV. Of 12 treated with DAAs, 11 (92%) achieved SVR; treatment was discontinued in 1 because of adverse effects.

Conclusion: High rates of SVR can be achieved in HIV/HCV co-infected patients usually considered a "difficult-to-reach" population. Our unique treatment cascade encompassing community and prison settings is very effective in reaching and managing HIV and HCV co-infected in these vulnerable populations. This model needs further study to determine whether it can be replicated in other Canadian settings.

CSP9.02

Influence of Sex Work and Sexual Behaviour on the Vaginal Microbiome and Cytokine Profiles of Young Women from Mombasa, Kenya

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Background: Commensal microbes and inflammatory cytokine/chemokines are part of the vaginal immune milieu, and are associated with HIV acquisition. The upstream drivers of vaginal dysbiosis and inflammation remain only partially defined.

Methods: We characterized the vaginal microbiome and cytokine profiles of sexually active young women aged 14-24 years from Mombasa, Kenya (n=168). Three groups of were recruited from hotspots where sex is commonly sold: 1) self-identified sex workers (n=72); 2) those with a history transactional sex and who did not self-identify as sex workers (n=30); and 3) a non-transactional, non-sex work group (n=66). Vaginal secretions were collected via self-inserted SoftCup and assayed for cytokines (Bio-Plex multiplex immunoassay kit) and vaginal microbiome (sequencing of the V4 region of 16s rRNA). We used non-parametric correlation and multivariate linear regression to compare microbiome and cytokine profiles by group.

Results: The median age was 20 (IQR: 18-22). In 60% of women (105/168) the vaginal microbiome communities were characterized by diversity (Gardnerella and/or Prevotella spp.-dominance); 29% (49/168) were dominated by *Lactobaccillus iners*. A greater proportion of the variability was explained by associations between multiple cytokines and microbiome group. Age was not associated with microbiome differences (p=0.27). Sex workers had increased alpha diversity(intra-participant), independent of age, sexual activity in the past week, HIV and STIs (estimate= 0.55, p= 0.01, 95% CI: 0.13-0.97). Sex work was associated with altered levels of several cytokines including IL7 (p=0.021), IFNa (p=0.050), MIP3b (p=0.005), IL17A (p=0.043) and IL17E (p=0.001). Several measures of recency of sex correlated with vaginal microbiome diversity. In non-transactional, non-sex workers, a shorter time since last sex was associated with greater microbiome diversity (p=0.008, r=-0.328).

Conclusions: Vaginal dysbiosis and inflammation are interrelated and common in young Kenyan women, increased in young sex workers, and may be influenced by minimal increases in even minimal frequency sex.

CSP9.03

Age Trends in HIV-related Prevention Opportunities for Adolescents in the Cango Lyec Cohort in Northern Uganda

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Background: Post-conflict regions suffer the legacy of trauma, violence and widespread displacement which includes increased rates of HIV. Adolescents represent the majority population in these regions, but tailored interventions to improve health care access are scarce. We aim to understand knowledge, attitudes & access to HIV prevention tools at different ages to identify opportunities for integrated prevention interventions. The study uses the Cango Lyec cohort, people residing in rural communities in Northern Uganda.

Methods: Adolescent girls between ages 13-24 years were recruited in February 2017 from 3 communities in Northern Uganda. Trained outreach workers went door-to-door and administered a comprehensive questionnaire on sociodemographic-behavioural characteristics, experiences of trauma & other vulnerabilities, sexual & reproductive health (SRH) service access & outcomes. Non-parametric testing was used to explore age-related trends in HIV risk factors & prevention strategies.

Results: Of 243 girls, 24.2% reported sexually activity in last 6 months, 20.9% had ever been married, almost all had at least primary education, and both the mean age at first sex and first pregnancy was 17.6 years. Overall 47.7% felt abstinence was their preferred prevention method against HIV/STIs, particularly among girls under 16 years (64.5%). Almost all girls said that HIV & pregnancy prevention services were available in their community, however only 51/202 had ever sought services, only 8 of whom were under 19 years.

Conclusions: Despite a high child marriage rate and young age at sexual debut, abstinence was the top HIV prevention method identified by girls, suggesting a gap in SRH education before first sexual encounter. Given the elevated risk of HIV in this region, there is a need to expand SRH for girls and boys at a younger age. School-based health programs could offer an entry-point, and new opportunities should be explored to reach adolescents out of school.

CSP9.04

What Happens After Hospital Discharge: ARV Pick-up and Physician Follow Up in Complex and Vulnerable HIV+ Adults

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Background: In order to achieve the 2020 HIV treatment goals, we need to identify and take strategic action for those most vulnerable at key times in the treatment cascade. We explored the discharge transition to primary care from Casey House, a small specialty hospital that provides care to the most complex and marginalized HIV patients.

Methods: We used Ontario's administrative health databases to identify patients admitted to Casey House, between April 1, 2009 and March 31, 2015. We used descriptive and regression analyses to examine rates and predictors of antiretroviral (ARV) pick-up and physician follow-up within 7 and 30 days after discharge, respectively.

Results: 268 patients were admitted between April 1, 2009 and March 31, 2015. The mean age was 48.7 years +/- 10.1. 82.8% (n=222) were male. The majority had a high co-morbidity burden with n=213 (79.4%) having been assigned to 10 or more Aggregated Diagnosis Groups (ADG). In addition, n = 210 (78.4%) were assigned to the highest Resource Utilization Band (RUB) 5 indicating 'very high expected resource use'. Of the 207 patients participating in the Ontario Drug Benefit program (ODB), 194 (88.9%) did not refill their ARV prescriptions within 7 days of discharge. Univariate regression found none of age, sex or medical complexity (using ADGs) to be significant predictors of medication pick-up. Of the 207 patients in the ODB program alive at discharge, 43 (20.7%) were readmitted or died in the 30 days post-discharge; 124 (75.6%) of the remaining 164 had a follow-up HIV outpatient visit within 30 days.

Conclusion: Complex patients with HIV are particularly vulnerable at times of transition. 88.9% did not fill their ARV prescriptions within 7 days of Casey House discharge; however the majority (75.6%) who remained in the community followed-up with an outpatient HIV visit within 30 days.

HIV in Women and in Pregnancy

Le VIH chez les femmes et pendant la grossesse

CSP6.01

Oak Tree Clinic Increases Safety and Respect for Women Living with HIV: Critical Need to Expand Women-Specific Trauma-Informed Care Models in BC and Beyond

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Background: Growing global evidence suggests high burden of trauma amongst women living with HIV (WLWH), yet there is surprising dearth of epidemiological research evaluating women-specific trauma-informed care (TIC) approaches. BC Women's Hospital Oak Tree Clinic (OTC) has been the only specialized women and family HIV care clinic in Canada for 23 years. Our study evaluated this model compared to all-gender community/hospital care.

Methods: Drawing on a longitudinal community-based cohort (SHAWNA, 2014-2017) of cis and trans WLWH, we evaluated associations of OTC on HIV provider characteristics that map on to women-specific TIC approaches. We use bivariate/multivariable logistic regression; and generalized estimating equations (GEE) to examine associations with use of OTC and ≥95% ART adherence.

Results: Of 288 women, there were 892 observations over 3 years of follow-up. Overall, 108 (37.5%) reported OTC as their main HIV care provider. In bivariate GEE analyses, use of OTC was associated with increased odds of safety, respect, engagement and equity on a range of indicators ("Feel like active participant in my care", OR:2.22,95%CIs:1.06-4.65; "doctor has enough time to talk to me", OR:3.40,95%CIs:1.65-6.98; "comfortable getting paps, OR:5.22;95%CIs:2.83-9.66; "comfortable discussing reproductive health", OR:2.03;95%CIs:1.39-2.95; "not concerned about HIV disclosure in the waiting room", OR:1.68,95%CIs:1.04-2.70; "women-only peer support groups available", OR:5.73,95%CIs:3.30-9.94). Women accessing OTC were also significantly more likely to report geographic barriers to care. In bivariate GEE, OTC was correlated with increased ART adherence (OR:1.58,95%CIs:1.03-2.41), though this association did not persist when adjusted for factors including lower socioeconomic status, higher drug use, and violence.

Discussion: Oak Tree Clinic attendance is linked to increased safety, partnering in care and respect among WLWH, key components of trauma-informed HIV care. Geographic barriers related to social structural vulnerabilities suggest a critical need to expand Oak Tree's model of women-specific trauma-informed care to cis and trans WLWH across Metro Vancouver, BC and beyond.

CSP6.02

A Systematic Review of Adverse Effects of Cabergoline in Women for Postpartum Lactation Inhibition or Suppression

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Background: Prevention or suppression of puerperal lactation is indicated for women with HIV positive serology, however studies have failed to demonstrate the efficacy of non-pharmacological strategies and the prescription of ergot derivatives has been generally abandoned due to the adverse cardiovascular, neurological and psychiatric outcomes associated with bromocriptine. Cabergoline has been recommended as an effective alternative to bromocriptine, however a compilation of studies reporting adverse effects is unavailable.

Objective: To perform a systematic review of adverse events reported with cabergoline use for postpartum lactation inhibition or suppression in women aged 15-50.

Methods: Following registration with PROSPERO (CRD42017049894), the MEDLINE, Embase, CENTRAL, and Pub-med electronic databases were searched from January 1985 to present for studies investigating the use of cabergoline for postpartum lactation inhibition or suppression. Two authors independently performed full review including a bias assessment, and abstracted data on included publications.

Results: A total of 466 articles were retrieved, with twenty articles eligible for inclusion: eight randomized control trials, eight cohort studies/non-randomized control trials, and four case studies/series. The majority of studies (16/20) reported whether adverse events were observed within the treatment group. Six (37.5%) studies reported no adverse events. Among a total of 757 women, the most common adverse events were dizziness (35/757), headache (30/757) and nausea/vomiting (19/757). These events were described as short-lived, self-resolving and dose-dependent. There was one non-randomized trial specific to the HIV population, where 98 women received a single dose (1mg) of cabergoline. Four women reported adverse events including dizziness (2/98) and epigastric pain (2/98), which resolved spontaneously by day three of assessment.

Conclusions: This systematic review reveals that adverse events were rare, benign, and tolerable following the

administration of cabergoline in this population. Therefore, cabergoline appears to be a safe choice for women seeking postpartum lactation inhibition or suppression for medical or personal motivations.

CSP6.03

Geographic Differences in Experiences of HIV Care: a Cross-Sectional Analysis of Women Living with HIV in Northern British Columbia

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Background: Rural and remote Canadian geographies bring unique challenges in accessing care for women with HIV. To better understand implications of geography on HIV care and outcomes, we compared demographics and access to HIV care for women enrolled in the Canadian HIV Women's Sexual and Reproductive Health Cohort Study (CHIWOS) residing within Northern Health Authority compared to those living in the rest of British Columbia.

Methods: Using baseline questionnaire data from CHIWOS participants, which enrolled women living with HIV residing in British Columbia, we compared demographics, HIV outcomes, access to HIV care and support services between women living in NHA (n=43) to those living in the rest of the province (n=313).

Results: Northern women had a lower yearly income (p=0.013) and were more likely to self-identify as Indigenous (p<0.001). Ninety-five percent of women in northern BC had accessed HIV care in the past year with more Northern women receiving primary HIV care from nurses than in the rest of the province (37% vs. 18%, p=0.006). More northern women had primarily specialist interactions for their HIV physician (60% vs.43%, p=0.049). Higher rates of substance-use (51% vs. 34%, p=0.026) and less access to support services for substance-use (35% vs. 18%, p=0.016) were experienced those living in the North. Lower median CD4 counts (395 vs. 565 cells/mm^3) and less years living with HIV (p<0.001) were also noted in women living in the north.

Conclusions: Differences in types of care providers accessed reflect health systems realities of HIV expertise among generalists and specialists in rural geographies and also suggest differences in preferences of who women choose to get primary and HIV care from. Concerning findings of barriers to accessing services for substance-use and shorter time from diagnosis of HIV have implications for the provision of high-quality care in northern and rural settings.

CSP6.04

Labour and Delivery Experience Among HIV-Positive Pregnant Individuals: a Qualitative Analysis

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Objective: To evaluate the labour and birth experience of people attending the Positive Pregnancy Program (P3), a multidisciplinary program in Toronto Canada, which cares for pregnant individuals and their families having, or living with increased risk for acquiring, human immunodeficiency virus (HIV).

Study Design: Qualitative interviews were performed by peer research associates with patients in the postpartum period. Each interview lasted from 1-2 hours, and interviews were carried out with successive patients until saturation of themes occurred. Interviews explored experiences with in hospital care during labour, birth and postpartum. Data was analyzed using NVivo.

Results: Six women living with HIV were interviewed. Respondents reported mixed experiences. Positive features of hospital stay included care by knowledgeable and compassionate practitioners (particularly if members of the P3 team were directly involved), automatic access to private rooms, and positive interactions with other medical and nursing staff. One major concern was fear of disclosure during the hospital stay, either inadvertent direct disclosure by care providers, or indirect disclosure as a result of specific aspects of care that are provided (the use of certain medications, private rooms). Another theme emerging was negative interactions with hospital staff based on HIV status (comments made, refusing to touch bloody garments) when P3 team members not present. A final theme related to fear regarding transmission to the baby, HIV stigma for the baby, and disclosure of HIV status due to the use of prophylactic antiretroviral treatment of the baby.

Conclusion: Satisfaction with the labour and delivery experience among P3 clients was mixed. Even within a program providing care to a large number of clients, there is significant room for improvement and ongoing care provider education in order to provide consistent, seamlessly educated and compassionate patient- and family-centred care.

CSP6.05

Health System Features that Enhance Access to Comprehensive Primary Care for Women Living with HIV in High Resource Settings: a Systematic Mixed Studies Review

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Introduction: Women living with HIV in high-resource settings continue to experience modifiable barriers to care. We sought to determine the features of care that facilitate access to comprehensive primary care, inclusive of HIV-specific care, co-morbidity screenings and management, and sexual and reproductive health.

Methods: Using a systematic mixed studies review design we reviewed qualitative, mixed methods and quantitative studies identified in Ovid MEDLINE, EMBASE, and CINAHL databases published between January 2000 and August 2017. Eligibility criteria included: women living with HIV; high-income countries; primary care; and health care accessibility. We performed a thematic synthesis using NVivo. Drawing upon a social-ecological framework on engagement in HIV medical care, we situated the themes across three levels of the healthcare system: care providers; clinical care environments; and social and institutional factors.

Findings: After screening 3,466 records, we retained 44 articles and identified 13 themes. At the care provider level, features enhancing access to comprehensive primary care included: positive patient-provider relationships and availability of peer support, case managers and/or nurse navigators. Within the clinical care environment, facilitators to care were: appointment reminder systems, non-identifying clinic signs, women and family spaces, transportation services, and coordination of care to meet women's HIV, co-morbidity, and sexual and reproductive healthcare needs. Finally, social and institutional factors included healthcare insurance, patient and physician education on HIV and women's health, and efforts to dispel HIV-related stigma. While women in qualitative studies emphasized trusting relationships with providers, transportation support, and stigma alleviation as critical to enhancing access to primary care, these features were seldom investigated in quantitative studies.

Conclusion: This review highlights several features of care that are particularly relevant to the care seeking experience of women living with HIV. Improving their health through comprehensive care requires a variety of strategies at the provider, clinic, and greater social and institutional levels.

CSP6.06

The Envisioned Model of Care for Women Living with HIV in Canada: The Oak Tree Clinic (OTC)

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Background: Women living with HIV (WLWH) have wished for gender-specific care for many years. In a recent study, Canadian WLWH identified three important features of women-centered HIV care: integrated services for HIV and women's health care; addressing social-structural determinants of health; and peer support/leadership.

Methods: Since 1994 the Oak Tree Clinic (OTC) at British Columbia (BC) Women's Hospital, has provided holistic care for women and their families in a safe, non-stigmatizing environment. A descriptive review of the care provided in this clinic includes observations on the types of care providers, and outcomes.

Results: The inter-disciplinary team includes adult, pediatric and obstetric/gynecological HIV specialists, nurse practitioners, nurses, dietician, pharmacists, psychiatrists, a trauma/addictions counselor, clinic/outreach social workers, and research staff. 81% of 700 clients receiving care in OTC are women, 101 are children, and they receive care across their lifespans, in a "one-stop-shop", through trauma-informed, harm-reducing services. Hepatitis C (HCV) treatment is offered to co-infected clients. In addition, peer support/leadership occurs through dedicated groups for Indigenous women, newcomers, and youth.

Clients attending the OTC have an HIV suppression rate of 86% (June 2016), compared with overall provincial estimates for women of 53%. Harder-to-reach WLWH are more likely to receive regular gynecological care if they are OTC patients. Since 1994, 646 pregnancies have been followed. In 414 mother-infants pairs engaged in care at OTC, there have been no perinatal transmissions for pregnant women on cART>4 weeks. Canadian perinatal surveillance data shows that BC has the least missed opportunities of cART in pregnancy.

Conclusions: The OTC delivers the care envisioned by WLWH in Canada, and addresses the structural barriers to HIV care that they and their families face, resulting in improved health for women living with HIV. Sharing this experience may help others build similar holistic, women-centered HIV care models within their capacity.

HIV Prevention

Prévention du VIH

CSP7.01

What Does HIV Pre-exposure Prophylaxis (PrEP) Do to Bone Health? A Systematic Review and Meta-analysis

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Background: Tenofovir disoproxil fumarate (TDF) has known negative effects on bone mineral density (BMD). We conducted a systematic review and meta-analysis to quantify the impact of TDF-containing PrEP on bone health.

Methods: We searched MEDLINE and EMBASE (1997 onwards), conference proceedings (01/2012-07/2017), www.ClinicalTrials.gov, and ISRCTN for randomized controlled trials comparing bone health outcomes after ≥1 year of oral TDF-containing PrEP versus no PrEP in HIV-negative individuals (Prospero CRD#42017070552). The primary outcome was 1-year change in BMD; secondary outcomes included fracture incidence, low bone mass and osteoporosis. We evaluated risk of bias and pooled outcomes where appropriate using DerSimonian-Laird random-effects models with weighting of studies according to the inverse variance method.

Results: Of 4525 articles identified, N=40 underwent full-text screening and N=10 articles were included (risk of bias: N=6 low, N=4 moderate). Five articles included MSM, while 5 included heterosexual adults. Pooled estimates from the four studies that measured BMD showed larger decline among PrEP users than controls at the lumbar spine (mean difference, MD= -0.82%, 95%CI= -1.28%, -0.37%, I^2=38%), and total hip (MD= -0.81%, 95%CI= -1.22%, -0.40%, I^2=48%) at ≥1 year. One study each, describing forearm and femoral neck BMD respectively, showed similar declines. Fracture incidence was not consistently higher with PrEP versus controls (N=5, pooled rate ratio=1.12; 95%CI=0.72, 1.74, I^2=26%); fracture numbers were similar between arms in two other studies but could not be pooled. Rates of osteoporosis and low bone mass could not be pooled due to variability in outcome reporting. Three of four studies reporting on "significant BMD loss" suggested this occurred more in PrEP patients than controls, however results could not be pooled.

Conclusions: TDF-containing PrEP is associated with a statistically significant negative effect on BMD but no short-term increase in fractures. Longer-term impacts on bone health and strategies to mitigate BMD decline require further study.

CSP7.02

False Positive HBsAg Resulting from Routine HBV Vaccination Prior to Initiating HIV Pre-exposure Prophylaxis

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Introduction: Pre-exposure prophylaxis (PrEP) is an effective strategy for HIV prevention. Hepatitis B virus (HBV) serostatus must be known prior to PrEP initiation as antiretrovirals are active against HBV. Vaccination is recommended for susceptible individuals. HBsAg measured shortly after vaccination can be detected, often leading to diagnosis of acute or chronic HBV. We describe the implications of two cases of vaccine induced HBsAg following routine evaluation for PrEP and HBV vaccination.

Case 1: A 54-year-old male was referred for PrEP. He reported no prior HBV vaccination, and received the first dose after initial evaluation. Serology drawn three days later demonstrated positive HBsAg, anti-HBs Ab < 3.1 IU/mL, and total anti-HBc Ab non-reactive. Ten days later, repeat serology demonstrated HBsAg non-reactive, anti-HBs Ab 82 IU/mL, and total anti-HBc Ab non-reactive, consistent with a vaccine induced false positive HBsAg, and subsequent vaccine induced seroconversion. PrEP was initiated after specialist referral 24 days after initial evaluation.

Case 2: A 34-year-old male inquired about PrEP initiation. He reported no prior HBV vaccination, and received the first dose after initial evaluation. Serology drawn five days later demonstrated positive HBsAg, anti-HBs Ab < 2 IU/mL, and total anti-HBc Ab non-reactive. After 29 days, repeat serology demonstrated negative HBsAg and HBV DNA < 20 IU/mL, consistent with a vaccine induced false positive HBsAg. Anti-HBs Ab was not re-measured. PrEP was not initiated as the patient was lost to follow up.

Discussion: Low level HBsAg can be detected 2-3 weeks after HBV vaccination. HBV markers measured in this window can mimic acute or chronic HBV, leading to misdiagnosis, unnecessary patient distress, additional laboratory testing, and specialist referrals. Additionally, PrEP initiation may be delayed or avoided. A structured work flow in PrEP clinics should ensure HBV serostatus is always measured prior to HBV vaccination.

CSP7.03

Problematic Outcome Reporting in Studies of Non-Occupational Post-Exposure Prophylaxis: a Call for Standardization

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Background: Studies of novel antiretroviral regimens for HIV non-occupational post-exposure prophylaxis (nPEP) are key to informing decisions by clinicians and policy-makers regarding what regimens to recommend to patients. However, variability in outcome reporting may hinder cross-study comparisons.

Methods: We conducted a systematic review of Medline, Embase, CINAHL and article bibliographies to identify randomized trials and cohort studies of three-drug nPEP regimens in HIV-negative adults, excluding sexual assault. We then identified 14 items necessary for adequately describing nPEP patient disposition, including: the number starting nPEP, nine mutually exclusive and exhaustive outcomes for the 28-day treatment phase, and four mutually exclusive and exhaustive outcomes for the follow-up phase. For each evaluated regimen, we assessed whether each outcome was A=clearly reported, B=not clearly reported but calculable from presented data, C=ambiguous or NR=not reported.

Item		A	B	C	NR
Number starting nPEP		27	2	0	0
Treatment phase	Lost-to-follow-up before day 28	18	0	11	0
	HIV-positive at baseline	12	0	5	12
	Stopped due to low-risk exposure	16	0	10	3
	Stopped due to adverse event	20	6	2	1
	Stopped for other reason	22	1	5	1
	Switched for adverse event	15	0	8	6
	Switched for other reason	15	0	8	6
	Completed 28 days but non-adherent	2	0	9	18
	Completed 28 days as prescribed	4	0	5	20
Follow-up phase	Lost-to-follow-up after day 28	12	3	8	6
	Seroconversion with additional risk exposure	24	0	4	1
	Seroconversion without additional risk exposure	24	0	4	1
	HIV-negative at final follow-up	11	1	13	4

Results: Of 1356 abstracts identified, 175 articles were full-text screened and 21 were included. These included 9 prospective cohort studies, 7 retrospective cohort studies, and 5 randomized trials. Studies provided 29 evaluations of 14 unique nPEP regimens overall. Findings on outcome reporting for these 29 evaluations are presented in the Table. Although the number of patients completing 28 days of nPEP was clearly reported in 26/29=90% of cases, in only 4/29=14% could the critically important outcome 'completed 28 days of nPEP as prescribed' be ascertained.

Conclusions: Patient outcomes are inconsistently reported in nPEP studies, rendering comparisons between studies challenging and potentially misleading. We propose a 14-item outcome reporting standard to facilitate transparent publication and interpretation of future nPEP studies.

CSP7.04

Cohorte PROTEGES: a Combined Prevention Approach Including PrEP in Montreal

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Objective: Montreal has joined the Fast Tracks Cities Initiative supporting UNAIDS'goal of 90-90-90. One strategy to reach this goal is to extend PrEP availability to marginalized, and high-risk individuals who do not regularly engage in the health care system. We initiated a community-based cohort (PROTEGES) to offer comprehensive HIV-STI prevention including PrEP delivery to gay, bisexual and other men who have sex with men (gbMSM). We will evaluate the impact of this approach overtime, and report on both barriers and facilitators to successful adoption of the various interventions.

Methods: PROTEGES will recruit 1000 HIV-negative MSM (cis and trans), through a community-based research clinic, social media and other community magazines, and will offer HIV-STI testing and counselling every three months. PrEP need is evaluated and prescribed as either on demand (dPrEP) or continuous (cPrEP), according to physician and participant's assessment. Participants may choose not to receive PrEP. Data on sociodemographic, economic, behavioral and clinical factors are collected at each visit.

Results: We report data for the first 250 participants enrolled. Median age is 35 years, 80% are Caucasian, 12% Hispanic, 4% Asian, 3% Black, 1% Aboriginal and 13% are non-Canadian citizens. 14% reported no health insurance coverage. Three (1%) participants were identified as HIV seroconverters at screening and were referred to treatment. 54% chose dPrEP while 41% chose cPrEP; 5% declined PrEP. 44% of participants had a history of bacterial

STI at baseline. After 6 months of follow-up 27% had one or more bacterial STI.

Conclusion: This combination prevention roll-out program is reaching a marginalized population at risk for HIV infection. High rates of bacterial STI were observed. This study will allow us to compare outcomes of various PrEP (c or dPrEP) and others prevention strategies on HIV and STI, as well as better understand the determinants of successful prevention.

CSP7.05

Feasibility of Vitamin D Supplementation Interventions to Mitigate PrEP-related BMD Loss: a Cross-sectional Survey of PrEP Users

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Background: Daily tenofovir disoproxil fumarate/emtricitabine (TDF/FTC) as HIV pre-exposure prophylaxis (PrEP) causes subclinical decreases in bone mineral density (BMD). We surveyed PrEP users to assess feasibility for a clinical trial of vitamin D supplementation to mitigate TDF-induced BMD loss.

Methods: We recruited participants using or starting PrEP in Toronto and Vancouver. The primary objective was to assess the acceptability of daily or weekly vitamin D supplementation. We also assessed the acceptability of calcium supplementation, existing use of non-pharmacologic bone health interventions, prevalence of osteoporosis risk factors, and bone health knowledge (Osteoporosis Knowledge Test, OKT).

Results: Of 152 participants, 72.1% were current PrEP users, 19.0% were starting PrEP, and 8.8% did not indicate their PrEP status. All identified as male, 88.8% as gay, and 67.1% as White. Median (IQR) age was 32.0 (29.0,40.5) years, and 63.2% reported family incomes ≥$60000/year. Among those not already using the interventions, willingness to supplement with daily vitamin D, weekly vitamin D, or daily calcium was very high at 92.2%, 98.0% and 94.8%, respectively. Only 31.6% reported adequate dietary calcium intake, while 44.1% reported ≥1 osteoporosis risk factor (most commonly, alcohol and smoking). Overall bone health knowledge was low, as median (IQR) OKT score was 16/32 (13,19). In post-hoc comparisons, current PrEP users may have been more likely than new PrEP users to already be taking vitamin D (39.6% versus 21.4%, p=0.07), and engaged in more bone loading exercise (Bone-specific Physical Activity Questionnaire score=8.4 versus 3.5, p=0.004), but they had similar levels of current calcium supplementation (11.2% versus 13.8%, p=0.70), adequate dietary calcium intake (33.7% versus 25.0%, p=0.38), and bone health knowledge (OKT=16 versus 14, p=0.09).

Discussion: The high acceptability of vitamin D and calcium supplementation in this cohort suggests that enrollment into a clinical trial of such interventions to mitigate PrEP-induced BMD loss is feasible.

Mental Health Issues for HIV Positive Persons

Questions de santé mentale pour les personnes séropositives au VIH

CSP10.01

Is Awareness of the HIV Prevention Benefits of ART Associated with Lower Anxiety During Sex? a Cross-sectional Analysis of Women Living with HIV in Canada

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Objectives: Sustained use of ART with an undetectable viral load effectively eliminates risk of sexual HIV transmission. Among women living with HIV, we sought to answer the question: Is awareness of the HIV prevention benefits of ART associated with lower anxiety during sex?

Methods: Data were drawn from the baseline questionnaire of the Canadian HIV Women's Sexual and Reproductive Health Cohort Study. Women who reported sex in the past month were asked, "Overall, how frequently have you become anxious or inhibited during sexual activity with a partner?" Awareness of ART prevention benefits was measured via the question, "How do you think taking ART changes your risk of transmitting HIV?" and defined as "makes the risk a lot lower." Logistic regression identified factors associated with sexual anxiety (n=398).

Results: The median age of women was 39 (interquartile range: 32-45), with 5.7% identifying as trans, 14.2% lesbian/queer, 24.5% Indigenous, 27.0% African/Caribbean/Black, and 41.6% White. Overall, 72.4% of women were aware of ART prevention benefits and 58.6% reported feeling no anxiety during sex, while the remainder said that they "always/usually" (14.6%) or "sometimes/seldom" (26.8%) became anxious during sex. Women reporting depression, previous illicit drug use, and current sex work had increased odds of sexual anxiety, while those reporting higher emotional closeness, more equitable relationship power, and a greater ability to communicate sexual desires to partners had reduced odds. In sub-analyses aimed at isolating the effect of awareness of ART prevention benefits while controlling for confounders, there was no association between being aware of ART prevention benefits and sexual anxiety.

Conclusions: Awareness of the HIV prevention benefits of ART was not associated with lower anxiety during sex for women in this study. Instead, correlations were found with social status, mental health, and the quality of sex and intimate relationships.

CSP10.02

Use of Mental Health and Addictions Providers among People Living with HIV in Canada: Results from the HIV, Health and Rehabilitation Survey (HHRS)

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Objective: Many people living with HIV experience poor mental health or addiction issues; however, we know little about mental health and addictions services use in community or tertiary settings. Our objective was to examine use and predictors of use of mental health and addictions providers among people living with HIV.

Methods: Using data from Ontario, British Columbia and Quebec (N=866) from a community-based, cross-sectional, on-line survey (HHRS), we used descriptive, bivariate and multiple logistic regression analyses (using the Andersen behavioral model) to examine and predict use of psychologists, psychiatrists, social workers, and addictions counsellors.

Results: The sample was 80% male, 76% non-heterosexual, and 67% white/Caucasian. Most (90%) reported currently receiving care from an HIV physician or HIV clinic. 42% reported currently living with a mental health condition; 26% reported currently living with an addiction. In the past year, overall, 33% had seen a social worker, 22% a psychiatrist, 18% a psychologist, and 12% an addictions counselor. Of those reporting a mental health condition, 48% had seen a social worker, 41% a psychiatrist, 28% a psychologist, and 19% an addictions counselor. Of those reporting an addiction, 50% had seen a social worker, 33% an addictions counsellor or psychiatrist, and 26% a psychologist. Bivariate analysis indicated a large number of predictors were associated with receipt of care from the mental health or addictions providers. Multiple logistic regression modeling indicated need factors (e.g., presence of a mental health condition, or addiction) were the strongest predictors of use of mental health or addictions care providers, with enabling factors (e.g., use of an AIDS service organization, care from an HIV doctor/clinic) and predisposing factors (e.g., adaptive coping) contributing to mental health or addictions care provider use.

Conclusions: Gaps in mental health and addictions services for people living with HIV exist that need to be addressed.

Opportunistic Infections and Malignancies

Infections opportunistes et pathologies malignes

CSP11.01

Willingness to Undergo and Beliefs Regarding Anal Cancer Screening among Men Receiving HIV Care in Ontario

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Background: Human papillomavirus (HPV) is responsible for the majority of anal cancers. Despite anal cancer rates that are up to 100-fold higher in HIV-positive men than in the general population, the most appropriate and acceptable approach to screening is unknown. Our objective is to assess HIV-positive men's stated willingness to undergo anal cancer screening.

Methods: A quantitative questionnaire examining knowledge and attitudes regarding HPV, its associated diseases and their prevention was administered to men in the Ontario HIV Treatment Network Cohort Study between 04/2016 and 06/2017. The questionnaire was developed using Theory of Planned Behaviour. We used logistic regression to assess associations of socio-demographic characteristics, knowledge, attitudes and experience with HPV and HPV-associated disease prevention with men's willingness to undergo anal cancer screening. Results are

reported as adjusted odds ratios (aOR) with 95% confidence intervals (CI).

Results: A total of 1688 men completed the questionnaire; 69% had previous experience with digital rectal exams (DRE), 36% with anal cytology, and 23% with anoscopy. The majority would be likely/very likely to undergo anal cancer screening via DRE (89%), anal cytology (90%), self-collected specimens (77%) or anoscopy (83%) if offered within the next year. The following were associated with increased odds of being likely/very likely to undergo anal cancer screening: knowing someone with HPV-associated cancer (aOR=2.11; CI=1.07,4.15); having been previously diagnosed with genital warts, HPV or anal pre-cancer (aOR=1.53; CI=1.02,2.30); experience with DREs (aOR=1.82; CI=1.28,2.58); comfort discussing anal health with one's HIV doctor (aOR=2.32; CI=1.58,3.41); confident one would be offered treatment (aOR=2.48; CI=1.51,4.06); and identifying as gay (aOR=2.11; CI=1.43,3.11). Age, race and previous HPV awareness were not associated with men's stated willingness.

Conclusions: Our findings demonstrate that personal experience with HPV-associated disease and prevention, comfort discussing anal health and confidence in treatment availability were major contributors to men's stated willingness to be screened.

Resistance

Résistance

CSP12.01

In vitro Selection of Resistance to Next-generation Integrase Inhibitors

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Background: Integrase strand transfer inhibitors {INSTIs), including dolutegravir (DTG), bictegravir (BIC), and cabotegravir (CAB) are the latest drugs for long-term HIV-1 treatment, based on their high potency and genetic barrier to resistance. This study used *in vitro* drug selections with primary HIV-1 isolates to examine potential pathways for resistance to DTG, BIC, and CTG.

Methods: Primary HIV-1 isolates, amplified from PBMCs (in=12) through co-culture in cord blood mononuclear cells (CBMCs), were serially passaged in escalating concentrations of DTG, BIC, CAB, elvitegravir (EVG) and raltegravir (RAL) for 26-46 weeks. Sanger sequencing ascertained the acquisition of resistance under selective drug pressure at weeks 8-9, 16, 24-30, and 36-46. Phenotypic drug susceptibility assays ascertained levels of resistance and cross-resistance to INSTIs.

Results: Parallel in vitro selections found resistance mutations in more strains for EVG (12/12), followed by CAB (8/12), and BIC and DTG (6/12 each). For EVG, T66I (n=14), E92 G/V/Q (n=3) or R263K (n=1) were followed by the accumulation of mutations leading to viral escape, high-level resistance to EVG with varying cross-resistance to RAL and CAB. With CAB, at the final passages, 8/12 selections resulted in R263K (n=3), Q148K/R (n=2), S153Y, or S147G. The acquisition of a Q148R/K in two strains led to viral escape and cross-resistance to all INSTIs. For DTG and BIC at the final passages, 6/12 strains had singleton mutations R263K, S153Y or H51Y which conferred low-level (<3-fold) resistance and reduced replicative fitness, precluding escalations in DTG and BIC beyond 5-25 nM.

Conclusions: There is a higher genetic barrier to resistance to BIC and DTG compared to CAB and EVG. R263K or S153Y singleton mutations confer <3-fold resistance to DTG and BIC, whereas more complicated patterns of high-level resistance were selected by CAB and EVG. Ongoing studies will deduce resistance to INSTIs in larger panel of viral strains.

CSP12.02

Three Decades of HIV Care: Impact of Treatment Experience on 6 Classes Of Multi-resistance Virus

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Background: Highly active antiretroviral therapies (HAARTs) have positively impacted survival in human immunodeficiency virus (HIV)-1 infection. Historically, pill burdens and long-term toxicities have contributed to poor compliance and virological failure. Our patient with 6 classes resistance highlights the current and future needs for novel treatments targeting new target sites in HIV-1 infection.

Case presentation: A 51 year-old MSM patient, chronically infected with HIV-1, subtype B, CDC stage 2, was diagnosed in 1992. Over the last 25 years he has experienced all available ART classes as shown in table 1. He is currently maintained on descovy (emtricitabine 200 mg/tenofovir alafenamide 10 mg) 1 tablet daily, etravirine 200 mg twice daily, darunavir 800 mg twice daily, ritonavir 100 mg twice daily and dolutegravir 50 mg twice daily. His genotype and virtual phenotype show absence of any fully active drug. In December 2017, his HIV RNA level was 3 $\log_{10}$ copies/mL and CD4 50 cells/mm^3.

Conclusions: This case highlights the ongoing need for deep of salvage ART therapy with durable virological response, lesser toxicity and higher resistance barrier. We are looking for novel options with different mechanism of actions and resistance profiles to treat such patient with multi-drug resistant HIV strains.

Table 1: Patient's laboratory and ART history timeline every 2 years since diagnosis.

Date	CD4 cells/ mm3*	CD4 %*	VL Log10 copies/ ml*	ART History	Genotypic profile
1992	380	NA	NA	AZT	NA
1994	70	NA	NA	AZT, ddC	NA
1996	95	NA	4.2	AZT, 3TC, SQV, then D4T, IDV	NA
1998	280	15	4.2	3TC, D4T, IDV	NA
2000	225	NA	4.5	3TC, ABC, SQV, RTV then D4T, ddI, EFV	41L, 74V, 118I, 184V, 210W, 215Y, 10I, 36I, 46L, 71V, 84V, 90M
2002	328	NA	2.4	D4T, 3TC, ABC, LPV	NA
2004	411	16	2.9	D4T, 3TC, ABC, LPV + Fuzeon	41L, 44D, 67N, 74V, 75M, 184V, 210W, 211K, 215Y, 103N, 100I, 10I, 20I, 36I, 46I, 54V, 71V, 84V, 90M
2006	330	15	3.3	LPV/r, Fuzeon, TDF, EFV	NA
2008	367	15	2.7	TDF, Fuzeon, DRV, RTV, ETR	41L, 44D, 62V, 75M, 181C, 210W, 215Y, 335D, 399D, 90I, 98G, 103N, 108I, 181C, 399D, 10I, 13V, 15V, 16E, 20I/L, 32I, 36I, 46I, 54V, 62wt/V, 64V, 71V, 74S, 76V, 82wt/I, 84V, 90M, 93L
2010	405	16	2.8	TDF, DRV, RTV, ETR, RAL, Maraviroc	41L, 44D, 62V, 75M, 181C, 210W, 215Y, 219wt/N, 90I, 98G, 103N, 181C, 10I, 13V, 15V, 16E, 20M, 32I, 33F, 36I, 46I, 54L, 64V, 71V, 74S, 76V, 82wt/I, 84V, 90M, 93L, 140S, 148H
2012	310	15	3.1	TDF, DRV, RTV, ETR, RAL	41L, 44D, 62V, 75M, 181C, 210W, 215Y, 335D, 399D, 90I, 98G, 103N, 108wt/I, 181C, 339D, 10I, 11I, 13V, 15V, 16E, 20M, 32I, 33F, 36I, 46I, 54L, 64V, 71V, 74S, 76V, 82I, 84V, 90M, 93L, 140S, 148H
2014	135	7	3.5	ETR, DTG, RTV, TPV	41L, 44D, 62V, 75M, 184I/wt, 210W, 90I, 98G, 103N, 181C, 10I, 11I, 32I, 33F, 46I, 54L/V, 71V, 74S, 76I, 84V, 90M, 74M, 97A, 140S, 148H, 184I/wt
2016	55	5	3.1	DTG, Truvada DRV, RTV, ETR	NA

* Mean value. ART= Antiretroviral therapy. NA= Not available. AZT=zidovudine, ddc=zalcitabine, 3TC=lamivudine, SQV=saquinavir, D4T=stavudine, IDV=indinavir, RTV=ritonavir, ddI= didanosine, EFV=efavirenz, ABC=abacavir, LPV=lopinavir, TDF=tenofovir, DRV= darunavir, ETR=etravirine, RAL=raltegravir, DTG=dolutegravir, TPV= Tipranavir

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CSP12.03

Resistance Analyses of Bictegravir/Emtricitabine/ Tenofovir Alafenamide Switch Studies

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Background: In two phase 3 clinical studies, HIV-1 suppressed adults who switched to novel, unboosted integrase strand transfer inhibitor (INSTI) bictegravir with the nucleos(t)ide reverse transcriptase inhibitor (NRTI) emtricitabine (F)/tenofovir alafenamide (TAF; B/F/TAF) from regimens consisting of either a boosted protease inhibitor (PI) + 2 NRTIs (N=290) or the INSTI dolutegravir (DTG) + 2NRTIs abacavir (ABC)/lamivudine (3TC; N=282) had low rates of virologic failure (VF, 1.4%) through week (W) 48, and switching was noninferior to comparator arms. Here, integrated resistance analyses are described.

Methods: Available historical plasma HIV-1 RNA genotypes and retrospective baseline proviral DNA genotypes, and virologic isolates from patients with HIV-1 RNA ≥200 copies/mL at confirmed VF, discontinuation, or W48 were analyzed for protease (PR), reverse transcriptase (RT), and integrase (IN) genotype and phenotype.

Results: Of the 572 patients who switched to B/F/TAF, pretreatment historical genotypes and/or retrospective proviral DNA genotypes of baseline viral isolates were analyzed for PR/RT (n=394) and for IN (n=158). Preexisting primary INSTI resistance (-R), NRTI-R, nonnucleoside RT inhibitor (NNRTI)-R, and PI-R substitutions were observed in 0.6% (1/158), 14.0% (55/394), 18.3% (72/394), and 6.3% (25/394), respectively. Pre-switch resistance to F and/or TAF was retrospectively detected at baseline in 8.9% (35/394) of patients and consisted of K65N/R (n=5), M184V/I (n=30), and/or ≥3 thymidine analog mutations (TAMs) that include M41L or L210W (n=4). One of 35 patients with preexisting F/TAF resistance experienced VF due to nonadherence. The post-baseline resistance analyses on viral isolates showed 0/5 patients on B/F/TAF and 1/7 patients in the comparator groups developed a treatment-emergent L74V substitution in RT (on boosted darunavir + ABC/3TC).

Conclusions: Low rates of VF occurred among participants who switched to B/F/TAF, including the 35 with preexisting F/TAF resistance. Through W48 there was zero treatment-emergent resistance in B/F/TAF treated patients demonstrating the utility of B/F/TAF in HIV-1-suppressed patients.

CSP12.04

Genotypic and Phenotypic Drug Resistance of Human Immunodeficiency Virus Type 1 Strains to Reverse Transcriptase Inhibitors in Suzhou, China

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After 30 years of the same 7 antiretroviral drugs being repeatedly used in China, it is important to find out the change of drug susceptibility and resistance of the circulating HIV-1. The goal of this study is to investigate the genotypic and phenotypic drug resistance of HIV-1 strains to a variety of used and non-used NRTI and NNRTI drugs in Suzhou, China. HIV-1 RT genes from 78 treatment-naïve or –experienced HIV patients in 2009-2012 and 135 patients in 2015-2016 were PCR amplified and sequenced for genotypic analysis. Twenty and 30 resulting RT fragments selected based on their sequence similarity and drug resistance pattern from the two groups were cloned into an NL4-3 backbone through a yeast-based cloning system to produce infectious viruses. The resultant chimeric viruses were analyzed by phenotypic drug resistance assay with various antiretroviral drugs, including the 6 RTI drugs being currently used in China. Genotypic analysis showed that, for the six RTI drugs currently used in China, in 2009-2012, there were only a number of accessory mutations, but no major known drug resistant mutations. However, in 2015-2016, there were 9.6% patients containing major drug resistant mutations. The phenotypic analysis confirmed the HIV-1 strains with the major known drug resistant mutations were resistant to certain antiretroviral drugs. Interestingly, 3.7% without any known major drug resistant mutation also showed some drug resistance, especially to the widely used ARVs in China. Even though no any major known drug resistant mutations were found in these strains, we did find some other mutations located in different subdomains of reverse transcriptase that might be responsible for the high level of drug resistance. This study revealed that the circulating HIV-1 strains in Suzhou, China, have developed significant drug resistance against most of the antiretroviral drugs currently applied in China.

Substance Use and HIV

Toxicomanies et VIH

CSP13.01

Addictions Care and Harm Reduction Interventions Among Inpatients Admitted with Injection Drug Use-associated Infective Endocarditis in Halifax, Nova Scotia

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Background: When people who inject drugs are admitted to hospital with infective endocarditis, often the acute infection is treated but underlying substance use disorders and associated potential harms are not addressed. No published data on the quality of addictions care in this population exist for the Canadian Maritimes, and opportunities to improve the cascade of addictions care are not clear.

Objective: To assess the quality of addictions care and harm reductions interventions offered to hospital inpatients admitted with injection drug use-associated infective endocarditis in Halifax, Nova Scotia.

Methods: This retrospective chart review is part of a larger project assessing the quality of hospital-based addictions care in Nova Scotia and New Brunswick. We identified all patients with injection drug use-associated IE admitted to the Queen Elizabeth II Health Sciences Centre, in Halifax, between April 1, 2012 and March 31, 2017. We collected data on substance use, HIV, and hepatitis C infection, and on addictions and harm reduction interventions, including referrals to addiction medicine, social work, and psychiatry, initiation of opioid agonist therapy (OAT), access to sterile injecting equipment, education on safer injecting, and naloxone prescribing. We also collected information on hospital course, and patient-initiated discharge against medical advice (AMA).

Results: Chart review is ongoing. So far, most patients with injection drug use-associated IE injected opioids. Some patients were referred to psychiatry and others were referred to a community-based addiction medicine specialist regarding their substance use. Many patients were admitted to the internal medicine service, but discharged or transferred back to their home hospital by cardiac surgery after a valve replacement. None had access to safe injecting equipment in hospital, and none were prescribed naloxone.

Conclusions: Patients admitted with injection drug use-associated IE in Halifax have varied patterns of addictions and harm reduction interventions. Opportunities to improve care are being identified.

CSP13.02

Barriers to Smoking Cessation Among HIV-Positive Patients at an Urban Primary Care Facility in Toronto

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Background: Tobacco smoking is much more prevalent among individuals with HIV compared to the general population. The higher prevalence of smoking in this population is leading to significant tobacco-related morbidity and mortality. People living with HIV/AIDS may face unique challenges when attempting to quit smoking.

Methods: A survey was developed to ask HIV-positive patients about: their smoking patterns; past quit attempts; perceived barriers to smoking cessation; knowledge level about the health impact of smoking, especially in the context of HIV; and discussion of smoking cessation at their clinic visits. Patients were recruited by health care providers during routine visits at an urban primary care facility in Toronto.

Results: Of the 14 survey respondents, 57% had been smoking for over 30 years. 71% had attempted to quit ≥3 times in the past. Only 57% had used pharmacotherapy to assist with smoking cessation; 43% reported that they were unable to afford these medications. A majority of respondents (64%) felt that smoking helped them to reduce feelings of stress, anxiety, or depression. Of those with past quit attempts, 58% indicated that smoking cessation had made these symptoms worse. Only 50% of our participants thought that they were more likely to develop health problems related to HIV if they smoked cigarettes. 85% of participants stated that their main HIV care provider had talked to them about smoking cessation, but only 38% reported that this was discussed with them at *most* visits.

Conclusions: Some HIV-positive individuals face significant barriers to smoking cessation, including co-morbid mental illness and financial barriers that limit use of pharmacotherapy. Patient awareness of the impact of smoking on HIV-related health outcomes is suboptimal. HIV clinicians should discuss smoking cessation more frequently, assist patients with obtaining pharmacotherapy if desired, and provide education on the importance of smoking cessation for long-term health outcomes.

CSP13.03

Criminal Justice Involvement as a Risk Factor for Detectable HIV Viral Load in People Who Use Illicit Drugs

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Background: Among HIV-positive people who use illicit drugs (PWUD) on antiretroviral therapy (ART), incarceration has been shown to adversely affect adherence to ART in a dose-dependent manner. However, the impacts of exposure to the criminal justice system (CJS), including both custodial and non-custodial involvement, on HIV virologic outcomes has not been previously investigated.

Methods: Data were obtained from a longitudinal cohort of HIV-positive PWUD in a setting of universal no-cost ART and complete dispensation records. Multivariate generalized estimating equations were used to calculate the longitudinal odds of having a detectable HIV VL associated with custodial and non-custodial CJS exposure.

Results: Between 2005 and 2014, 716 HIV-positive ART-exposed PWUD were recruited. Among these, 82 (11.4%) reported recent custodial involvement and 62 (8.6%) reported noncustodial involvement in the criminal justice system at baseline. In multivariate analysis, both custodial (Adjusted Odds Ratio [AOR] = 0.61, $p<0.001$) and noncustodial (AOR = 0.78, $p<0.039$) involvement in the criminal justice system was associated with detectable HIV VL.

Conclusions: Among HIV-positive PWUD, both custodial and non-custodial involvement in the criminal justice system is associated with worse HIV treatment outcomes. Our findings highlight the need for increased ART adherence support across the full spectrum of the criminal justice system.

CSP13.04

Identifying Smoking Cessation Targets for PLHIV in a Tertiary Care Setting

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Background: Tobacco smoking is among the most significant predictors of cardiovascular disease and lung cancer in people living with HIV(PLWHIV). Smoking rates are high, confirming the need for effective, targeted smoking cessation(SC) strategies. SC strategies may differ by sociodemographic and clinical sub-groups of PLHIV. We conducted an exploratory analysis of tobacco-related clinical and sociodemographic characteristics of tobacco smokers at the Chronic Viral Illness Service(CVIS) to inform SC interventions.

Methods: Between April and September 2017, tobacco-smoking PLHIV were referred to complete a 10-minute

questionnaire on tobacco-related behaviours and outcomes. Data were stratified by hepatitis C(HCV) serostatus to account for unmeasured socioeconomic or psychosocial factors that also influence tobacco smoking. Univariate and bivariate non-parametric statistical analyses were conducted.

Results: 72 patients participated. Overall, oral therapy (e.g. varenicline)(16.7% [95%CI:8.9-27.3%]) and counseling for smoking cessation(5.6% [1.5-13.6%]) were used less than nicotine patches(50.0% [38.0-62.0%]) or 'other' methods, which included abstinence and nicotine gum(50.0% [95%CI:38.0-62.0%])(p<0.001). Compared to HCV-seronegative participants(n=43), HCV-seropositive participants(n=29) were more likely to have ever injected drugs(86.2% [95%CI:68.3-96.1%] vs. 7.0% [95%CI:1.5-19.1%], p<0.001), started smoking younger(median:16 [95%CI:11-24] vs. 21 [95%CI:19-26], p=0.019), appeared to smoke more cigarettes per month(median:525 [95%CI:300-600] vs. 270 [95%CI:180-375], p=0.064), appeared more likely to report coughing(51.7% [95%CI:32.5-70.6] vs. 30.2% [95%CI:17.2-46.1], p=0.086) or shortness of breath from mild exertion(78.6% [95%CI:60.3-92.0] vs. 48.8% [95%CI:33.3-64.5%], p=0.014), and showed less interest in quitting within six months(51.7% [95%CI:32.5-70.6%] vs. 78.6% [95%CI:61.4-88.2%], p=0.022).

Conclusion: Counseling and oral therapy were underutilized evidence-based SC strategies in this sub-sample of CVIS patients, regardless of HCV serostatus. HCV-seropositive patients were more likely to have injected drugs, were less interested in quitting, appeared to smoke more, and had more smoking-related symptomatology. SC approaches for this population could be paired with socioeconomic or psychosocial interventions, such as financial incentives or treatment for comorbid mental health disorders, which have demonstrated positive impacts on SC rates.

CSP13.05

Predictors of Quit Attempts or Interest in Smoking Cessation in a Cohort of People Living with HIV in Ontario

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Introduction: Although cigarette smoking is more prevalent among people living with HIV than in the general population, little is known about quit attempts or interest in smoking cessation in this population.

Methods: Study **s**ample included 638 people (mean age: 49 years; 80% men; 69% White, and 69% gay, lesbian, or bisexual) who were current smokers and enrolled in the OHTN Cohort study. Data on quit attempts or interest in smoking cessation were collected through interviews. We used logistic regression method to identify variables associated with quit attempts or interest in quitting smoking.

Results: Of the 638 individuals**,** 338 (53%) had tried to quit in the past 12 months or they were interested in quitting smoking. In multivariable analysis, lower annual household income (<$40K: aOR=0.54: 95% CI: 0.32 to 0.92; *p*=0.023 and income $40K- $80K: aOR=0.49; 95% CI: 0.27 to 0.92; *p*=0.026) and longer duration of smoking (per 10 additional years of smoking: aOR=0.72; 95% CI: 0.72 to 0.95; *p*=0.007) were associated with fewer quit attempts or less interest in smoking cessation.

Amongst a sub-group of 293 smokers who were interested in quitting and had contact with a health care provider in the past year, 271 (92%) were advised to reduce or quit smoking. However, only 53% were offered nicotine replacement therapy or prescription medications, 37% were provided with smoking cessation counseling, and 22% were referred to smoking cessation programs.

Conclusions: Our results suggest that: a) low income and longer years of smoking were associated with less quit attempts or interest in cessation and; b) amongst smokers interested in cessation, less than half were offered counseling or referred to smoking cessation programs. Due to their frequent contact with people living with HIV, health care providers should proactively screen for cigarette smoking and offer counseling, support, and referrals to smoking cessation programs.

Other

Autres

CSP14.01

The CTN's Research Toolbox: Open-access Tools to Support Canadian Researchers

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The CIHR Canadian HIV Trials Network (CTN) was created in 1990 with a mandate to support Canadian researchers seeking treatment and a cure for HIV. In 2017, the CTN produced an open-access, online toolbox which is a compilation of tools the CTN has created to support researchers. These tools have been updated to enable researchers to be compliant with the recent Health Canada adoption of the updated, international guideline, *ICH: Good Clinical Practice (R2)*. The CTN is providing these tools and templates through open-access to: 1) Provide clarity and transparency around the processes for collaborating with the CTN; and 2) To ensure that all Canadian researchers, their staff and students, particularly those working in therapeutic areas related to sexually transmissible and blood-borne infections (STBBIs), have effortless access to the tools and

templates they require to support their research projects. In addition, the CTN is actively seeking collaboration with researchers and organizations that conduct or support community-based research and implementation science to promote links to their resources with the goal of increasing the repository of open-access tools and templates available to support all types of health research. The CTN Research Toolbox can be accessed at: http://www.hivnet.ubc.ca/research-portal/ctn-toolbox/ and those wishing to add links or new resources can contact the CTN at info@hivnet.ubc.ca.

CSP14.02

National Survey Assessing Knowledge and Management of the Drug Interaction Between Dolutegravir and Metformin by Canadian HIV Practitioners

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Background: A well-described pharmacokinetic drug interaction between dolutegravir and metformin results in increased exposure to metformin. However, no conclusive management recommendations exist. This study was conducted to examine current Canadian practice.

Objectives: The study objectives were to describe Canadian practitioners' knowledge and management of the interaction, including assessment of interprofessional or regional variations, and to identify factors that influence the decision to administer metformin and dolutegravir concomitantly.

Methods: The study was an online survey of Canadian physicians, nurse practitioners, and pharmacists caring for HIV-infected patients. The survey consisted of multiple choice, short answer, and case-based questions administered via SimpleSurvey. An iterative process was used to pilot the survey electronically in French and English prior to two waves of survey dissemination.

Results: The survey was distributed to 179 practitioners (response rate 36 %, completion rate 83%). The majority (93%) knew the interaction increased metformin exposure; of these, 65% correctly identified the magnitude. In clinical scenarios, 67-90% of respondents administered the medications concomitantly, with some electing to decrease the metformin dose. Closer monitoring of renal function, diabetes, and metformin tolerability, including lactic acidosis, was suggested by respondents co-administering dolutegravir and metformin. Diabetes-related factors, dolutegravir dose, and renal dysfunction commonly affected co-therapy decisions. There was minimal variation by profession, though practice in Alberta may differ slightly.

Conclusion: A majority of clinicians did not consider co-administration of dolutegravir and metformin to be contraindicated. However, factors such as maximum metformin dose, renal dysfunction, and diabetes-related conditions were most likely to affect decisions to continue co-therapy.

CSP14.03

Improving Access to Care for People Living with HIV in Manitoba through Electronic Consultation

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Background: The Manitoba HIV Program (MHP) provides care to approximately 1300 people living with HIV (PLHIV) in Manitoba. Nine Circles Community Health Centre (NCCHC) acts as the main primary care site for the MHP; 50% of NCCHC's patient population are living with HIV. NCCHC and the MHP's specialty care site are both centralized in Winnipeg, but 17% of PLHIV currently in care in Manitoba live outside of Winnipeg. HIV has become a chronic manageable disease, and care is increasingly moving into the primary care setting. However, timely access to specialist advice is essential to maintain quality of care. Our team has begun to implement and evaluate an electronic consultation service (eConsult) in Manitoba to address gaps in care for PLHIV and to improve access to specialty advice for all Manitobans.

Objective: To describe specialist referral wait times and the early implementation of eConsult in Manitoba.

Study design: Retrospective chart audit and quality improvement, technology adoption.

Results: A chart audit of 100 referrals sent between September and December 2014 was completed at NCCHC. Median wait time for specialist advice was 111 days for non-urgent referrals. The most common specialties consulted were Gastroenterology, Hepatology, Ophthalmology and Psychiatry.

The Manitoba eConsult service was launched on December 1, 2017. Specialty services available at the time of launch were HIV Specialists, HIV Pharmacists, Addictions, Gastroenterology and Ophthalmology with additional specialties being added on an ongoing basis. The volume of consults, services consulted and wait times for eConsult responses are being collected on an ongoing basis with data to be available at the time of the CAHR conference.

Conclusions: PLHIV and other Manitobans have long wait times for specialist advice. The implementation of Manitoba eConsult will improve access to care and decrease waits for specialist advice for PLHIV in Manitoba.

CSP14.04

Improving Access to HIV Specialists Through the Champlain BASETM eConsult Service

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As the care for people living with HIV transitions to the realm of primary care, electronic consultation (eConsult) can improve access to specialist expertise and facilitate a collaborative care model. eConsult is a secure, web-based platform for asynchronous communication between primary care providers (PCP) and specialists. Through the Champlain BASE™ eConsult service, PCPs can ask questions regarding patient care to the HIV specialty group, which includes medical HIV specialists, as well as a pharmacist and social worker with HIV expertise. In this study, we describe the use and impact of an eConsult service in the care of people with HIV and characterize the common question types and clinical topics asked by PCPs. We conducted a cross-sectional analysis of the 28 eConsults sent to the HIV specialty group between February 2015 and January 2017. Usage data and responses to the mandatory close-out survey completed by the PCP were analyzed using descriptive statistics, and a pre-defined list of validated taxonomy was used to classify each eConsult by question type. A thematic analysis was performed on the consultation logs to identify common themes. Among the 28 eConsults, 46% resulted in advice regarding a new or additional course of action. The most common question type was related to drug treatment (50%), and 32% of the cases were sent to the HIV pharmacist. A common emerging theme was the clinical and pharmaceutical complexity in caring for people living with HIV. PCPs also used eConsult for advice regarding HIV prevention and pre-exposure prophylaxis for HIV negative patients. PCPs highly valued the eConsult service, rating the value of the service an average of 4.8 on a 5-point Likert scale. This study demonstrates that eConsult is an efficient and valuable service that improves access to HIV specialists to support PCPs in providing comprehensive care to people with HIV.

CSP14.05

Characterizing Pharmacist Interventions of a Province-Wide HIV-Specialized Clinical Pharmacy Support Service

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Background: In BC, antiretroviral (ARV) distribution is centrally managed by St. Paul's Hospital (SPH) Ambulatory Pharmacy for the BC-CfE in HIV/AIDS Drug Treatment Program. Approximately 40% of 7000 participants have ARVs couriered from SPH Pharmacy to another healthcare site. In a 2012 program evaluation, these "outreach" patients were less likely to achieve optimal adherence and meet minimum bloodwork monitoring standards compared to patients who picked up ARVs at SPH Pharmacy with enhanced clinical services. In response, an HIV-specialized clinical pharmacy support service was implemented in 2014 to systematically identify and address ARV drug-related problems (DRPs) for "outreach" clients at the time of prescription fill. Here we characterize the activities of this novel, province-wide clinical pharmacy service.

Methods: All ARV prescriptions processed for outreach patients between 1-Jun-2015 and 31-Dec-2015 with drug-related problem(s) identified upon screening were included. Patient demographics, prescriber-type, DRP type and interventions were extracted from prescription records and clinical notes.

Results: Over the 7 month evaluation period, a total of 1984 potential DRPs were identified in 1027 unique outreach patients. Median age was 49 years (range 17-84), 75% were male. The majority had ARVs delivered to a community pharmacy (71%) or physician office (16%). Patients were distributed amongst the health authorities: Vancouver Coastal (42%), Fraser (22%), Vancouver Island (18%), Northern (10%), and Interior (8%). During the study period, patients had a median of 1 DRP encounter (range 1-7). Median 245 DRPs (range 176-277) were addressed each month and included detectable HIV-RNA (41%), bloodwork overdue (27%), potential non-adherence (13%), and drug-drug interaction (10%).

Conclusion: Patients across the province experience clinically important ARV-related problems. A centralized, integrated HIV-specialized clinical pharmacy service is uniquely positioned to provide targeted support to patients and clinicians over a wide geographic area. An analysis of the impact of this new service on clinical outcomes is planned.

CSP14.06

Development of an HIV National Clinical Observership Program for Pharmacists

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Background: Pharmacists play a significant role in optimizing care for HIV patients, managing challenges of adherence, resistance, comorbidities, polypharmacy and drug interactions. HIV residency programs or electives provide specialized training but may not be ideal for practicing pharmacists. A national observership program

was developed to meet the learning needs of working pharmacists.

Description: The observership program was launched in 2017 by a national network of HIV pharmacists. Program objectives were to improve pharmacists' confidence in HIV therapy management, to increase awareness of different practice sites and subspecialties, and to promote collaboration. All pharmacists wishing to gain clinical experience or specialized knowledge through shadowing/teaching with another HIV pharmacist were eligible to apply. Observerships of 1 to 5 days in duration were offered.

Action: A working group developed terms of reference and application criteria. Funding was secured for one year via an unrestricted industry educational grant. Calls for applications were issued through the network, with priority given to new practitioners or those from rural/ underserviced areas.

Evaluation: To date, 4 observerships have been completed with all participants completing surveys on their experience. On average, observers had worked for 4 years, with less than 6 months of experience providing HIV care in a hospital (50%) or clinic/community (50%) setting; 75% were practicing in a small urban centre. Overall, pharmacists found the observership to be extremely beneficial, and resulted in increased confidence in therapeutic knowledge and ability to provide care and enhanced professional networking with potential for future collaboration. All preceptors felt the workload was reasonable and were willing to offer future observerships.

Implications: A national clinical observership program has been successful in providing learning and mentorship opportunities for HIV pharmacists. Continued program funding is being pursued. This program may serve as a model for implementation in other countries or in other therapeutic areas.

Epidemiology and Public Health

Épidémiologie et santé publique

Data Science: Use of Administrative Data, New Measurement Tools other Novel Data Sources in HIV Public Health Research

Science des données : Utilisation des données administratives, nouveaux outils de mesure, autres sources originales de données en recherches sanitaires publiques sur le VIH

EPHP4.01

A PESTEL Analysis of HIV POCT in the Canadian Context

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Background: Access to testing for HIV remains an important cornerstone of national efforts aimed at reducing the onward transmission of the virus and in facilitating timely access to care, treatment and support. However, access to testing innovation such as point of care testing remains variable across Canada.

Objectives: The focus of the *Moving Beyond Piloting* (MBP) study was to examine the distribution of HIV Point-of-Care (HIV POCT) pilot projects in Canada since 2005, the approval date of the INSTI rapid HIV test, and to survey program providers. To achieve this the MBP research team mapped INSTI HIV POCT in Canada between 2005 and 2015 and collected survey data from those with experience in developing and delivering HIV POCT.

Methods: Using a political, economic, social, technological, legal and environmental (PESTLE) analytical framework to interpret the survey data, and Tableau software to map the distribution of INSTI HIV POCT test kits across Canada over time, we were able to develop a snapshot of this testing innovation relative to barriers and facilitators that contribute to sustainable HIV POCT programming.

Results: Our results present data from both the mapping of HIV POCT test kits as well as the survey data which indicate that the scaling up and sustainability of HIV POCT testing interventions is constrained by a variety of overlapping and intersecting factors.

Conclusions: HIV POCT kit distribution remains uneven throughout Canada, and there are a number of key PESTLE factors contributing to the scaling up of testing interventions such as HIV POCT.

EPHP4.02

Phylodynamic Methods of Identifying Foci of HIV-1 Transmission

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Background: Identifying neighbourhoods at high risk for ongoing HIV transmission is critical for prioritization of limited public health resources to both support people living with HIV (PLHIV) and prevent new cases through harm reduction services. Since transmission of HIV to a new host is equivalent to the formation of a new lineage, diversification rates inferred from viral phylogenetic trees can serve as estimates for transmission rates. By combining diversification rates with clinical viral load measurements and geographic data, we develop a new metric, viral load-weighted diversification rate (VLWDR), to identify areas simultaneously containing viruses with high replication and transmission rates.

Methods: We apply this method to 5,190 HIV-1 sequences from 2,853 anonymized patients living in British Columbia (BC) spanning 20 years. These data were split into five 4-year time intervals to build five approximate maximum likelihood phylogenetic trees from which diversification rates were calculated. VLWDR was calculated by combining this data with patients' associated plasma viral loads. By aggregating data by patients' census tract of residence, the spatial and temporal distribution of clinical and phylogenetic measures, including VLWDR, was analyzed in relation to corresponding HIV incidence in those areas.

Results: Pearson correlations reveal that total VLWDR per 100,000 people is significantly correlated with HIV incidence in the same areas during the same time intervals ($r=0.88$, $p<0.001$). The data was used to fit a multivariate spatial regression model to predict HIV incidence. From the model, we ranked areas in BC that are likely to experience high ongoing HIV transmission.

Conclusions: Areas with simultaneously high viral load and HIV transmission rates as measured by VLWDR, tend to have high HIV incidence. Aggregating phylogenetic and clinical HIV data by patients' area of residence effectively identifies HIV transmission hot spots without compromising patients' privacy and confidentiality.

EPHP4.03

Impact of a Community Facility on Health Care Utilization in Complex Patients with HIV

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Background: People with HIV have high rates of health service use. We explored the healthcare utilization of patients admitted to a community HIV hospital in the year prior to an admission and the year post discharge.

Methods: We used Ontario's administrative health databases to identify patients admitted to Casey House between April 1, 2009 and March 31, 2015 and in comparison, adults over 21 years of age living with HIV in Ontario. We compared rates of hospital admissions, emergency department visits, family physician visits, and home care visits in the 12 months before admission and after discharge from Casey House.

Results: We studied 268 patients admitted to Casey House and 19,765 adults in the general HIV cohort. The mean age was 48.7 years +/- 10.1 and 46.0 +/- 11.6 years for the Casey House and Ontario cohort, respectively. 82.8% (n=222) and 79.9% (n=15,794) of Casey House patients and the general HIV cohort, respectively, were male. Among Casey House patients, rates of emergency department use prior to admission and following discharge were 4.61 and 2.46 per person year, respectively ($p< 0.0001$). Rates of hospital admission before admission and following discharge were 1.39 per person year and 1.12 per person year, respectively ($p=0.05$). Home care visits and family physician visits increased from 24.29 and 18.33 visits per person year in the year prior to admission to 35.63 ($p<0.0001$) and 22.59 ($p<0.0001$) in the year post-discharge. Rates of utilization in Casey House patients were between 3 and 12 times higher than rates in the general HIV cohort.

Conclusion: Health care utilization of complex patients with HIV was significantly different before and after admission to a community hospital focused on HIV care. Specifically, emergency department usage declined and home care and family physician visits increased. This has implications for cost to the healthcare system.

EPHP4.04

High Healthcare-Associated Direct Costs Associated with Mental Health Disorders among People Living with HIV in British Columbia, Canada

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Background: People living with HIV (PLWH) who have concurrent mental health disorders (MHDs) may face numerous intersecting barriers to care. MHDs pose an enormous economic burden to individuals and healthcare systems. We assessed the impact of MHDs on healthcare direct costs among PLWH in British Columbia (BC), Canada.

Methods: This is a retrospective population-based cohort study. Eligible study individuals were recruited from the STOP HIV/AIDS population-based cohort. These individuals were ≥18 years old, naïve to ART, started ART between 01/01/2000 and 31/12/2013, and were followed until the earliest of death date, 31/12/2014 or the last contact date. The main outcomes were bi-annual direct costs (in 2015$CDN) associated with the number of physician visits and acute hospitalizations across BC. The main exposure was the presence of MHDs identified using a published case-finding algorithm. Four types of MHD were examined: anxiety, mood, personality and schizophrenia-related disorders. A two-part confounder regression model examined the effect of MHD on healthcare direct costs adjusting for demographic, health- and treatment-related factors.

Results: Of the 4774 individuals, followed for a median of 5.48 years (25th-75th percentile: 2.98-8.79), 50% had at least one MHD by the end of follow-up. The result of the multivariable confounder model showed that individuals with MHD incurred, on average, higher bi-annual costs than those without MHD ($1,177; 95% CI ($933-$1,420); 59% attributed to acute hospitalizations). Additionally, MHD-related costs were also higher in females, those younger than 30 years, with a baseline CD4 cell count <200 cells/mm^3 and <95% adherent.

Conclusions: Substantial healthcare-related direct costs, particularly related to acute hospitalizations, were associated with having MHDs. Our findings indicate that within universal care settings, such as BC, providing integrated mental health and HIV care, particularly for youth and women living with HIV, may help to reduce overall healthcare costs.

Economic Evaluation of Policies, Programs or Interventions

Évaluation économique des politiques, des programmes ou des interventions

EPHP5.01

The Cost-effectiveness of Get Checked Online vs Clinic-based Testing for the Screening of HIV in gbMSM in Metro Vancouver

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Background: GetCheckedOnline.com (GCO) is an online testing service that aims to increase HIV testing among gay, bisexual and other men who have sex with men (gbMSM). We assessed the current cost-effectiveness (CE) of GCO and for different GCO uptake scenarios compared to clinic-based testing in Metro Vancouver.

Methods: Our cost-utility analysis assessed CE using a dynamic gbMSM HIV incidence compartmental model. The model estimated the chances of becoming infected with HIV, progress through disease stages, and then to be diagnosed. Model parameters were taken from a Vancouver-based gbMSM survey and cohort, and published estimates of disease progression. Costs were estimated based on program data and published literature. Costs and benefits were discounted at a 1.5% rate assuming a lifetime horizon, using 2017 Canadian dollars. The base case scenario, which was based on estimates informed by ongoing GCO research, assumed 4.7% uptake of GCO, and 74% of high-risk and 44% of low-risk infrequent testers becoming regular testers. Scenarios tested increases of GCO uptake to10% and 15%. Our main outcome was incremental cost-effectiveness ratio (ICER) per quality-adjusted life year (QALY). Willingness-to-pay (WTP) was set at $50,000 Canadian dollars.

Results: The mean cost per HIV screening test for GCO vs clinic-based testing was estimated at $30.47 and $57.99, respectively, yielding 47.5% of savings per test. Base case and increased uptake scenarios resulted in ICERs below $35,000.

Conclusions: Expanding HIV testing for gbMSM through increasing uptake of GCO is a cost-effective alternative to expanding clinic-based services. We noted that difference in total costs might be smaller if a battery of STI tests is considered which in turn may adversely affect our CE estimate. For the next phase of cost-effectiveness analysis we will expand our model to include sexually transmitted

infection testing and consider other comparative testing models (e.g., routine testing in health care settings).

Epidemiology and Surveillance of HIV Co-infections

Épidémiologie et surveillance des coinfections au VIH

EPHP1.01

Differing Profiles of People Diagnosed with Acute and Chronic Hepatitis B Virus Infection: a Large Population Based Study

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Objectives: To describe characteristics of people diagnosed with acute and chronic hepatitis B (HBV) infection in British Columbia (BC), Canada to support prevention, screening and treatment programs.

Methods: We used data from the BC Hepatitis Testers Cohort (BC-HTC), which includes all individuals tested for HCV or HIV or those diagnosed with HBV in BC since 1990. These data were integrated with prescription drug, medical visit, hospitalization and mortality data. HBV cases were classified as acute or chronic according to provincial guidelines. Risk factors associated with acute or chronic HBV infection were assessed with multinomial logistic regression models.

Results: 46,498 of the 1,058,056 eligible BC-HTC participants were diagnosed with HBV infection; 95.7% with chronic infection at HBV diagnosis. Substance use, major mental illness and HIV or HCV co-infection were more common among individuals with acute HBV. Persons with acute HBV were predominantly white (78%) while those with chronic HBV were mostly East Asian (60%). Relative to whites, East Asians had 12 times greater odds of being diagnosed with chronic HBV infection. These odds increased with increasing socioeconomic deprivation.

Conclusions: Acute HBV infection co-occurred with other infections and social conditions, suggesting the need for the integration of HBV prevention, screening, and treatment programs with those of other sexually transmitted infections for optimal care. Chronic HBV was more common among immigrant populations from HBV-endemic countries who had low prevalence of traditional risk factors, necessitating programs focusing on at-risk ethnic groups, including foreign-born East and South Asians, for early diagnosis and treatment initiation.

EPHP1.02

Population-level Cascade of Care for Hepatitis C in British Columbia: Differences Over Time, by Gender and Birth Cohort

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Background: Population-level monitoring of people living with hepatitis C virus (HCV) across the cascade of care helps identify gaps in access and engagement in care and treatment. We characterized changes in the cascade of care in British Columbia (BC) from 2000 to 2016 and differences by gender and birth cohorts.

Methods: The BC Testers Cohort (BC-HTC) was used for this analysis. It includes all individuals tested for HCV in BC since 1990 and their data were linked to data on prescription drugs, medical visits, hospitalizations and mortality data. We defined the following cascade of care stages: 1) anti-HCV positive(diagnosed); 2) RNA tested; 3) genotyped; 4) initiated treatment; and 5) achieved a post-treatment sustained virologic response(SVR).

Results: The number of anti-HCV positive individuals diagnosed in BC as well as the proportion of RNA testing and genotyping gradually increased over time. Treatment initiation and SVR after treatment increased very slowly until 2013 when, corresponding with the introduction of the first direct-acting antivirals (DAAs) in BC, a marked increase was seen in both stages.

In 2016, there were more anti-HCV positive males than females living in BC. Females were more likely than males to be RNA tested (84% vs 80%) and to clear infection spontaneously (32% vs 23%). Both males and females with active infection moved through the continuum of the cascade in a similar fashion.

People born between 1945-64 represented the highest burden of HCV in 2016. Compared to younger birth cohorts, they had higher genotyping (90% vs 83%) and treatment initiation rates (52% vs 32%).

Conclusions: Although there has been progress across the cascade of care, gaps remain in treatment initiation, especially for younger birth cohorts. This is expected given that the current standard for treatment requires fibrosis staging ≥ F2 and fibrosis is less likely in younger individuals.

EPHP1.03

Advancing Evidence-Based HPV Vaccination and Screening Delivery for Gay, Bisexual and Other Men Who Have Sex with Men (gbMSM) and People Living with HIV

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Background: Human papillomavirus (HPV) is the most common sexually transmitted infection worldwide, and some HPV-related cancers are on the rise. Yet, HPV vaccination and screening strategies are under-investigated among gbMSM and people living with HIV, underserved populations at high risk for HPV-related disease.

Objectives: Our community and stakeholder partnerships will bring together and triangulate emerging knowledge and evidence from on-going HPV-related projects in Ontario. We will identify and recommend best approaches for vaccination and screening in these populations.

Description and Approach: We will work in two phases: 1) evidence synthesis and 2) knowledge translation and exchange. First, we will consolidate data from eight parallel projects (Table 1): five quantitative surveys with gbMSM and people living with HIV; a national quantitative physician survey on barriers and facilitators of HPV vaccination in these populations; quantitative analysis of administrative health data on Pap testing among HIV+ women; and qualitative interviews with HIV+ gbMSM and service providers. Next, during the knowledge translation and exchange phase, a Steering Committee will conduct stakeholder consultations with community, providers and policy makers to jointly interpret findings and recommend strategies to optimize HPV vaccination and screening.

Significance: Triangulating findings across multiple data sources, samples, and methods will generate robust evidence on HPV vaccination and screening. Potential biases and limitations in one source may be offset by the strengths of another. Our approach will facilitate community, policy and practice stakeholder direction on next steps for vaccination and screening interventions for these underserved populations at high risk for HPV-related disease.

Table 1: Overview of populations served and HPV-related information domains across contributing parallel projects for evidence synthesis

					Vaccination			Anal Cancer Screening			Cervical Cancer Screening	
Study	Population Served	Quantitative	Qualitative	Knowledge of HPV	History	Willingness	Practices	History	Willingness/ Acceptance	Attitudes	History	Attitudes
Engage-HPV	gbMSM	•		•	•	•						
iCruise	gbMSM	•	•	•	•	•						
OCS: Women	HIV+ women	•										
CHIWOS	HIV+ women	•									•	•
HPV-SAVE												
Quantitative - OCS: Men	HIV+ men	•		•	•	•		•	•	•		
Canadian Provider Survey	gbMSM	•		•			•					
ICES	HIV+ women	•									•	
HPV-SAVE Qualitative	HIV+ gbMSM		•	•	•	•		•	•	•		

OCS: Ontario HIV Treatment Network Cohort Study; CHIWOS: Canadian HIV Women's Sexual & Reproductive Health Cohort Study; HPV-SAVE: HPV-Screening and Vaccination Evaluation Study; ICES: Institute for Clinical Evaluative Sciences

EPHP1.04

Patterns of Hepatitis C Virus (HCV) Testing in a Clinical HIV Cohort in Ontario, Canada, 2000-2015

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Background: Individuals with HIV are vulnerable to HCV acquisition via injection drug use (IDU), blood, and condomless anal sex. HIV care provides an opportunity for HCV screening and treatment with curative HCV therapies. We sought to characterize patterns of HCV testing in a cohort of HIV patients in Ontario, Canada.

Methods: Data was collected at 9 specialty HIV clinics participating in the OHTN Cohort Study (2000-2015) using chart abstractions, annual interviews and record linkage with Public Health Ontario Laboratories. We estimated annual proportions of participants who tested for HCV (serological/RNA tests) per calendar year, overall and by HIV risk categories. We identified correlates of ever testing using generalized estimating equations.

Results: As of 2015, 84.2% of 5,550 under follow-up had tested for HCV atleast once, with 16.3% ever testing HCV positive**.** The proportion (95% CI) tested annually increased to 36.8% (35.2%, 38.4%) in 2015 (p<0.0001). Testing was highest in PWID: 54.1% (47.1%, 61.1%) in 2015 (Table 1). Those who ever tested were more likely to be urban-dwelling [Incidence rate ratio, 95% CI= 1.29 (1.23, 1.36)]; age <30 [1.13 (1.11,1.16)]; ever tested for syphilis [1.71 (1.58, 1.85)]; have history of IDU [1.11(1.08, 1.14)].

Conclusion: Annual HCV testing increased over time. Those who never tested for HCV made up 16% of the study population and should be considered for screening, since they may still be at risk for HCV co-infection. Future directions include examining patterns in repeat/frequent testers, HCV diagnoses and effects of time by subgroup.

Table 1. Annual proportion tested for Hepatitis C virus (HCV) in the OHTN Cohort Study, 2000-2015

			By subgroup			
Calendar Year	Number of participants under follow-up that calendar year	All participants	MSM	MSM-PWID	PWID	Female, no history of injection drug use
2000	2,812	12.4%	9.9%	14.6%	24.7%	15.8%
2001	2,921	13.1%	11.1%	12.5%	23.3%	14.0%
2002	3,096	14.5%	12.3%	23.1%	22.6%	17.9%
2003	3,216	13.7%	11.1%	18.0%	25.0%	15.4%
2004	3,378	16.0%	14.6%	24.7%	25.7%	15.7%
2005	3,489	20.4%	20.8%	26.8%	28.7%	15.2%
2006	3,651	20.7%	21.0%	25.3%	27.2%	18.7%
2007	3,793	27.0%	26.9%	35.4%	40.1%	22.1%
2008	3,929	24.8%	25.0%	37.4%	32.3%	21.9%
2009	3,991	25.2%	24.6%	37.8%	36.5%	20.3%
2010	4,155	24.3%	25.9%	34.4%	38.0%	16.1%
2011	4,155	24.1%	25.5%	37.7%	33.8%	16.8%
2012	3,874	23.1%	25.9%	40.6%	31.0%	12.0%
2013	3,892	26.7%	29.3%	32.8%	33.8%	18.0%
2014	3,856	33.4%	35.1%	43.6%	31.1%	27.4%
2015	3,745	36.8%	37.4%	47.4%	54.1%	30.3%

MSM: men who have sex with men; MSM-PWID: men who have sex with men who inject drugs; PWID: people who inject drugs; HCV: Hepatitis C virus; OHTN: Ontario HIV Treatment Network.

EPHP1.05

Identifying and Characterizing Hepatitis C Virus (HCV) Mixed Infections Using an Unbiased Next-generation Sequencing (NGS) Pipeline

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The impact of mixed genotype HCV infections on disease progression and treatment outcomes is poorly understood. This study developed and evaluated an unbiased methodology to detect and characterize mixed infections.

PCR, random primer (RP), and probe enrichment (PE)-based NGS methods were compared. A pipeline was designed to detect and classify multiple HCV genotypes and ROC curve analysis was used to select cutoffs for detecting mixed infections based on HCV read depth and coverage.

Methods were validated using 72 artificially mixed samples and applied to 140 HCV clinical trial samples (ACTIVATE, DARE-CII) and 2 suspected mixed infection cases (Canadian Coinfection Cohort (CCC)). As RP and PE methods can sequence any RNA virus, HIV was also investigated in the CCC samples.

PCR-NGS was biased towards Gt1b, 2, 3 and 5 in artificially mixed samples, while no bias was observed with RP and PE. PE yielded 4-fold greater read depth than RP but had lower coverage (95% versus 99%). RP and PE sequencing of 140 samples identified the following primary genotypes: 106 Gt3, 21 Gt1a and 13 Gt2. On average, 2% and 1% of HCV reads/sample mapped to a second genotype using RP and PE although none passed the cutoff criteria suggesting low frequency of mixed infections. Phylogenetics was used to investigate 7/140 samples with several thousand reads mapping to secondary genotypes. Consensus sequences of these genotypes clustered with their respective primary genotype (not with predicted reference) confirming they were not mixed infections. Of the two suspected mixed infection cases, one was confirmed and the other excluded, as it was a recombinant genotype. Only 13 HIV reads were found in one CCC sample, likely due to antiviral suppression of HIV.

We have developed a novel unbiased method to identify mixed HCV infections that can be potentially extended to evaluate HIV-HCV co-infections.

EPHP1.06

Monitoring Trends in HIV/Hepatitis B Co-infection in 3 Suburban HIV Clinics: Lagos, Nigeria

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Introduction: HBV and HIV are endemic, mainly in sub-Saharan Africa and in the Far East and share their routes of transmission, although HBV is more infectious than HIV. HIV and HBV infections share risk factors and is quite common. More than 80% of HIV-positive patients have some markers of past or current HBV infection. HBV screening is not standard practice in many HIV clinics. There is paucity of data on prevalence of HIV/HBV co-infection at the primary care level which prompted to need to monitor these trends.

Methods: Tapping into already existing structures with community mobilisation, household testing and counselling, identification and referral of HIV clients to health facilities, whilst ensuring quality service and utmost confidentiality, the participants were recruited for the World Hepatitis Day 2017 event where HIV-positive clients in treatment were offered HBV testing to estimate the prevalence in 3 suburban hospitals in Lagos, Nigeria. The study design was a prospective observational report.

Results: Data spanning across the *3* sites showed that *431* participants were screened. The cohort's average age was *34±6* years and most were on *TDF/3TC/EFV*. *12 (2.8%)* were hepatitis B surface antigen positive. Analysis in terms of sex showed HIV/HBV co-infection significantly more in the *female: 9 (2.1%)* participants than in the *male: 3 (0.7%)* participants. The risk of hepatitis B co-infection was not significantly different when analysed in terms of viral load or age.

Conclusions: More than half (52%) of the participants showed some evidence of hepatitis B exposure. HIV/HBV co-infection is common in HIV-seropositive and can cause significant mortality and morbidity. However, efforts need to be channelled into advocacy for vaccination programs for HBV especially in non-immune HIV-infected individuals. Women health education, community ownership of these efforts as well as community programs need to be driven, owned by and embedded in the communities.

EPHP1.07

Substance Use Following Direct Acting Antiviral Therapy: a Missed Opportunity?

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Background: Widespread access to direct acting antivirals (DAA) should facilitate hepatitis C (HCV) viral eradication leading to a decrease in liver-related mortality in HIV-HCV co-infected populations. However, competing comorbidities may mitigate health benefits from successful DAA treatment. We investigated the impact of DAA therapy on changes in alcohol, illicit drug and tobacco consumption among HIV-HCV coinfected individuals.

Methods: The Canadian Co-Infection Cohort Study prospectively follows 1785 HIV-HCV co-infected participants from 18 centres. Data on sociodemographic, clinical, substance use and treatments are collected biannually. We used segmented generalized estimating equation models to evaluate changes in alcohol, illicit drug and tobacco consumption post-DAA treatment. Multivariate models included age at DAA initiation, Indigenous ethnicity, sex, income and psychiatric diagnoses.

Results: Between 2014-2016, 318 participants initiated oral DAAs, 200 completed at least 1 visit before and after DAA therapy (total of 1868 visits) with a mean of 3.2 years (SD 2.6) pre- and 0.7 years (SD 0.5) post-DAA follow up

time. Sustained virologic response (SVR) rates were 95%. At DAA initiation 17% reported injecting- and 16% snorting-drugs; 53% consumed alcohol; 59% smoked- tobacco, 43% marijuana 6-months prior to initiating DAAs. Table 1 summarizes secular trends in alcohol, illicit drug and tobacco consumption before DAA initiation, and post-DAA trends (following ascertainment of treatment response).

Table 1. Changes in drug, alcohol and tobacco consumption after oral DAA therapy Adjusted odd ratios (95% Confidence Intervals)

	Injection Drug Use (last 6 months)	Intranasal Drug Use (last 6 month)	Alcohol Consumption (last 6 month)	Tobacco use (last 6 month)	Marijuana use (last 6 month)
Pre-treatment, per year (Secular trend before DAA initiation)	0.94 (0.91, 0.97)	1.05 (0.99, 1.11)	1.00 (0.98, 1.01)	1.00 (0.98, 1.01)	0.98 (0.97, 0.99)
Changes in trends, per year (Post-DAA trends compared to pre-treatment trends)	1.06 (0.91, 1.35)	0.76 (0.51, 1.11)	1.11 (1.00, 1.24)	1.02 (0.95, 1.10)	1.14 (1.01, 1.27)

Conclusion: SVR rates were high in a population with active substance use. While injection drugs use did not appear to increase in the short term post-DAA treatment, alcohol use increased which may mitigate health benefits of HCV viral clearence.

EPHP1.08

Reductions In Healthcare Service Usage Following Direct Acting Antiviral Therapy

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Background: High costs of direct acting antivirals (DAAs) have limited treatment access worldwide. Empirical evidence on the cost benefits of DAAs in real-world populations would support wider treatment access. We investigated the impact of oral-DAA therapy on healthcare services utilization (HCSU) among HIV-Hepatitis C (HCV) coinfected individuals in Canada.

Methods: The Canadian HIV-HCV Co-Infection Cohort Study prospectively follows 1785 participants from 18 centres. Data is collected biannually through self-administered questionnaires. We used a segmented multivariate negative binomial mixed model to evaluate the impact of DAAs on annual HCSU rates. HCSU was defined as out-patient visits (number of visits to walk-in, general/HIV practitioners and specialist) and in-patient visits (emergency room and hospitalization). Out-patient visits pre-treatment were truncated 6-months prior to initiation to account for changes in HCSU in preparation of initiating DAAs. Follow-up time post-DAA treatment included visits following ascertainment of treatment response (>12 weeks post-DAA treatment). Multivariate models included age, sex, fibrosis, psychiatric diagnoses, CD4 cell count, HIV viral load, injection drug use.

Results: Between 2014-2016, 318 participants initiated oral DAAs, 200 completed at least 1 visit before and after DAA treatment (total of 1868 visits) with a mean of 3.2 years (SD 2.6) pre- and 0.7 years (SD 0.5) post-DAA follow up time. Median age at DAA initiation was 52 (IQR 48, 56), 90% had HIV viral load <50 copies/mL, median CD4 count was 505 cells/mL and 27% had evidence of liver fibrosis. Sustained virologic response rates were 95%. Out- and in-patient visits increased annually 17% and 6% respectively before DAA initiation. Post-DAA treatment, there was a 41% reduction in annual out-patient visits compared to pre-treatment rates (Incidence Rate Ratio (IRR) 0.59, 95% CI 0.31, 1.12) and a 21% reduction in annual in-patient visits (0.79, 0.58, 1.07).

Conclusion: We found early signs of reductions in HCSU post DAA therapy.

EPHP1.09

Overdose, Chronic Disease and HIV-Related Complications Driving Mortality Outcomes Among Marginalized Populations of People Living with HIV

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Background: In a setting of universally provided antiretroviral therapy (ART), HIV-related mortality has declined substantially, meaning people living with HIV (PLWH) are often coping with other health concerns over the life-course. This study investigates mortality outcomes among a cohort of historically marginalized PLWH.

Methods: Between 2007-2010, 1000 PLWH across British Columbia participated in a cross-sectional interviewer-led survey on health outcomes and health care as part of the Longitudinal Investigation into Supportive and Ancillary health care (LISA) study. Study participants were recruited via convenience sampling and are reflective of historically marginalized populations of PLWH. For the purposes of this analysis, we examined mortality outcomes as captured

by Ministry of Health data as of June 30, 2017. Explanatory logistic regression modelled the probability of death.

Results: Of the 910 participants included in this analysis, 194 (21.3%) died by the end of follow-up. Of the recorded deaths, 42 (21.6%) were attributed to overdose while 37 (19.1%) were attributed to HIV-related causes, 33 (17.0%) to cardiovascular disease and 32 (16.5%) to cancer. In the multivariable model, we observed elevated odds of mortality among Indigenous PLWH (aOR: 1.48, 95% CI: 0.99, 2.20), older PLWH (aOR: 1.07, 95% CI: 1.05, 1.10) and among those using tobacco (aOR: 1.74, 95% CI: 1.11, 2.73), injection drugs (aOR: 1.43, 95% CI: 0.95, 2.15), and reporting problematic drinking (aOR: 1.43, 95% CI: 1.00, 2.06) at baseline. Risk of mortality was reduced among PLWH with viral suppression (<50 copies/mL) (aOR: 0.22, 95% CI: 0.14, 0.34), higher CD4 cell counts (aOR: 0.90, 95% CI: 0.82, 0.98), and those reporting stable housing (aOR: 0.50, 95% CI: 0.34, 0.74) at baseline.

Conclusion: Overdoses, HIV-related complications and chronic diseases are main drivers of mortality among marginalized PLWH. Harm-reduction strategies, including appropriate drug, smoking and alcohol interventions, are increasingly important among aging PLWH to reduce mortality.

EPHP1.10

The Syndemic of HCV Infection and Mental Health Disorders among People Living with HIV: The Impact on Acute Care Hospitalizations

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Background: Hepatitis C virus (HCV) represents the most prevalent co-infection among people living with HIV (PLW-HIV). The majority of healthcare utilization among people living with HIV and HCV (PLW-HIV/HCV) are due to extrahepatic conditions, including mental health disorders (MHD). Thus, we examined the combined impact of HCV and MHD on the rate of acute care hospitalizations among PLW-HIV in British Columbia, Canada.

Methods: This retrospective cohort study was conducted using data from the STOP HIV/AIDS population-based cohort. Individuals were antiretroviral therapy-naïve, were ≥18 years old, had initiated treatment between 1 January 2000 and 31 December 2013, and were followed for ≥6 months until 31 December 2014, last contact date or date of death. The outcome was acute hospitalization rate per individual for each year. The exposure was the interaction between HCV co-infection status and MHD (i.e., anxiety disorders, mood disorders, personality disorders and schizophrenia-related disorders (SRD)). A multivariable non-linear mixed-effects model was built, adjusting for several demographic and time-dependent factors.

Results: Of 4246 individuals, the 14-year age-sex standardized acute hospitalization rates were 12.67/100 person-years (PY) (95% Confidence Interval (CI) 11.20-14.38) for PLW-HIV without MHD, 36.91/100PY (95% CI 33.61-40.55) for PLW-HIV/HCV without MHD, 20.68/100PY (95% CI 18.85-22.71) for PLW-HIV with MHD, and 70.55/100PY (95% CI 67.87-73.34) for PLW-HIV/HCV with MHD. The adjusted rate ratio for acute care hospitalizations among PLW-HIV/HCV without MHD, PLW-HIV with MHD, and PLWH-HIV/HCV with MHD relative to PLW-HIV without MHD were 1.78 (95% CI 1.49-2.12), 1.51 (95% CI 1.28-1.77) and 2.72 (95% CI 2.33-3.18), correspondingly. Among individuals with MHD, those with SRD relative to those with other disorders had considerably higher rates.

Conclusion: A strong syndemic exists between HCV and MHD among PLW-HIV, as evidenced by the multiplicative interaction. Reductions in acute hospitalization rates may require a multi-faceted, cohesive system of service delivery targeting this syndemic.

EPHP1.11

Integration of Surveillance and Laboratory Data in a Sexually Transmitted Infections and Bloodborne Infections (STIBBI) Data Mart

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STIBBI surveillance (i.e. chlamydia, gonorrhea, syphilis, HIV, and hepatitis C [HCV]) is generally focused on identifying factors around the time of a new diagnosis. Additional data sources are needed to understand STIBBIs in the context of an individual's life course. The STIBBI Data Mart integrates surveillance data and laboratory tests performed by the British Columbia Public Health Laboratory (BC-PHL) to evaluate co-infections, testing patterns, and timing of infections. BC-PHL performs about 30% of all chlamydia/gonorrhea tests and >95% of all syphilis, HIV, and HCV in BC. The STIBBI Data Mart includes all laboratory testing records of persons tested for chlamydia since 1991, gonorrhea since 2000, syphilis since 1990, HIV since 1988, and HCV since 1991. All case reports of reportable STIBBIs were included: since 1988 for chlamydia, gonorrhea, and syphilis, since 1990 for HCV, and since 1995 for HIV. A probabilistic patient matching algorithm is applied to integrate all records for unique individuals based on first name, last

name, date of birth, sex, and provincial health number. Testing episodes were created to account for multiple tests related to the same disease event (e.g. anti-HIV, p24, and Western Blot testing) based on clinical input and testing pattern analysis. The STIBBI Data Mart is refreshed nightly with the latest source system data providing near real-time data for monitoring disease trends and outbreaks. Data quality has improved due to the use of standard algorithms to apply complex case and episode definitions. The STIBBI Data Mart now produces indicators for co-testing and co-infection (e.g. HIV/HCV, HIV/syphilis) and testing patterns (e.g. HCV incidence among repeat testers, time since last negative HIV for new diagnoses) that could not previously be reported and which have become standard indicators. This system will provide testing and infection history to characterize subpopulations for optimal follow-up and services.

Evaluations of Public Health Programs and Interventions

Évaluation des programmes et des interventions en santé publique

EPHP2.01

Trauma- and Violence- Informed Care: Building Capacity to Provide Safer, More Inclusive Services for STBBIs

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Background: Trauma is disproportionately experienced by those most vulnerable to STBBIs, including people who use substances (Giordano et al., 2016), Indigenous peoples (McCall & Lauridsen-Hoegh, 2014), and people living with HIV (LeGrand et al., 2015), making Trauma- and Violence-Informed Care (TVIC) a promising approach toward safer, more inclusive STBBI services. In attempt to build capacity of providers and organizations across Canada to reduce STBBI stigma, The Canadian Public Health Association (CPHA), in partnership with the Calgary Sexual Health Centre, has developed and pilot tested a workshop focused on incorporating TVIC into sexual health, substance use, and STBBI services,

Methods: Several scoping activities informed the workshop's development, including a scan of the TVIC literature and key informant interviews with health and social service providers. Pilot workshops were delivered in the fall/winter of 2017-2018 across Ontario, Alberta, British Columbia, and the Yukon with participation from a broad range of providers. Pre- and post-evaluation questionnaires assessed participants' growth in knowledge of the types of trauma and stigma, the principles of TVIC, and TVIC strategies to reduce STBBI stigma.

Results: Results to this point are promising and highlight the necessity of training in this area. Participants have reported growth in knowledge around all topic areas and are finding the content relevant and applicable. Six-month follow up will reveal the extent to which participants are using the workshop resources and learning in their practice, and sharing workshop information with colleagues.

Conclusions: Preliminary evaluation findings demonstrate that this workshop offers a new perspective by exploring TVIC as an approach to stigma reduction. Training service providers is an important strategy to address barriers to the access and use of STBBI services, and to ultimately improve health outcomes. Findings from this initiative will help inform the development of future training opportunities focused on STBBI stigma reduction.

EPHP2.02

Turning Knowledge into Action: An Evaluation of the Impact of CATIE's Programs and Services for Frontline Workers in Canada

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Background: CATIE is Canada's source for up-to-date, unbiased information about HIV and hepatitis C. CATIE champions and supports innovation and excellence in HIV and hepatitis C knowledge exchange.

Methods: In 2017, CATIE conducted a national online survey of frontline workers to assess the overall success of our complement of programs and services in knowledge exchange. The survey was designed to evaluate CATIE's reach, frequency of use, relevance, usefulness and effectiveness. Frequency descriptives were compiled from 328 frontline workers from across Canada who completed the online survey.

Results: CATIE is reaching its intended audiences. Respondents came from a diverse array of frontline organizations working in HIV, hepatitis C and sexually transmitted infections – most of whom (66%) work from an integrated STBBI approach. Collectively these organizations provide a full range of HIV and hepatitis C services; target a diversity of populations; and provide services across Canada.

Frontline workers report that CATIE's programs, services, tools and resources are relevant to the work that they do (98%); increase their knowledge of HIV (96%) and hepatitis C (97%); that they can use/apply this knowledge in their work (98%); and that information from CATIE increases their ability to respond to the needs of their community (96%).

Just over 90% of frontline workers report using the knowledge they gain from CATIE to educate/inform many different types of stakeholders and almost 80% report using information from CATIE to change work or programming practices. Frontline workers provided over 60 examples of how CATIE's programs, services, tools and resources have changed their programming.

Conclusion: Frontline workers feel CATIE is meeting their knowledge exchange needs and expectations. Many respondents stressed the importance of CATIE's programs and services to their work and requested more of what CATIE already delivers including in-person learning and networking opportunities, online learning opportunities and resource development.

EPHP2.03

Cohort Profile: The STOP HIV/AIDS Program Evaluation (SHAPE) Study

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Background: The STOP HIV/AIDS Program Evaluation (SHAPE) study was initiated to evaluate progress of the STOP HIV/AIDS initiative in expanding the reach of HIV testing, treatment, and care throughout British Columbia (BC). The study monitors determinants of progression along the HIV cascade of care (COC) to provide critical information for addressing health inequities and barriers to care.

Methods: The SHAPE cohort will enrol 810 participants, reflecting key geographic, demographic, and clinical characteristics within the population of people living with HIV (PLWH) ≥19 years in BC. This study considers how key characteristics including gender, income, sexual identity, ethnicity, and geography influence engagement in HIV care. Participants complete a baseline and two follow-up surveys over 36 months collecting information concerning HIV-care experiences. Survey responses are linked to longitudinal clinical HIV data. To promote inclusivity, individuals are offered the option of participating online (self-administered), in person, or by phone (peer interviewer).

Cohort Composition: Between October 2016 and November 2017, 532 participants had completed the baseline survey. Among participants, the median age was 50, 417 (79%) were male, 104 (20%) were Indigenous, 328 (62%) identified as MSM, and 124 (23%) reported a history of injection drug use. Participants residing in Vancouver Coastal Health Authority constituted 61% of the enrolled cohort; other participants were distributed amongst Northern Health (13%), Fraser Health (12%), Vancouver Island (8%), and Interior Health Authorities (7%). Preliminary analysis found that 96% of participants were on antiretroviral therapy and 86% had achieved viral suppression.

Lessons Learned: Our sample is reflective of PLWH in urban areas, and overwhelmingly engaged in HIV-care. Creative strategies will be needed to recruitment individuals not engaged in care and populations that are less likely to access community-based organizations. This study may inform the development of interventions to support PLWH who are starting antiretroviral therapy.

EPHP2.04

Findings from the APPROACH Study: a Pharmacy-based Point-of-Care Testing Model for HIV in Two Provinces

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Background: Current estimates suggest 21% of Canadians living with HIV do not know they are infected. HIV point-of-care testing (POCT) provides opportunities to expand access to testing in non-traditional settings and areas of low healthcare resources. The purpose of the APPROACH study was to develop and evaluate a community pharmacy-based HIV POCT program in urban and rural settings of Alberta and Newfoundland.

Methods: An HIV POCT model was developed and implemented in a 6-month pilot study in 4 pharmacies. Provincial advisory committee members informed design of the model, pharmacist training, community resources for client support and linkage to care, and study promotion and advertising. Individuals ≥ 18 years without previous known HIV infection were eligible for testing. Study participants completed pre- and post-test questionnaires to collect demographic information and views on their testing experience. Pharmacist workload was also assessed. Descriptive statistics were used to summarize tests performed, participant demographics, and pharmacist time to complete testing.

Results: 123 individuals were tested during the pilot study. Mean age was 35 years, 76% were male, and 80% were white. Two-thirds reported being single or casually dating/hooking up, and 48 (53%) of males and 24 (89%) females reported engaging in condomless sex with males. 28% were not previously tested for HIV or were unsure of testing. Of these, approximately 70% were at moderate, high or very high risk of HIV according to the Denver HIV Risk Score. The average time to complete testing was 30 minutes. 122 tests were non-reactive and 1 was reactive. The reactive test was confirmed as HIV infection and the individual successfully linked to care.

Conclusions: A successful model of pharmacy-based POCT, including linkage to care, was developed. Further research is needed to determine the effectiveness and cost-effectiveness of this approach in reaching individuals at high risk of HIV infection.

EPHP2.05

A High Demand for Hepatitis C Education among Healthcare Providers in British Columbia

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Background: Many people diagnosed with hepatitis C (HCV) do not proceed along the HCV cascade of care. Patient and provider HCV knowledge gaps are associated with low engagement in HCV care. These gaps may increase given the rapidly changing HCV care and treatment landscape, which includes more people receiving HCV care from primary care and community-based organizations. Reducing providers' HCV-related knowledge gaps is a key factor in facilitating engagement in HCV care.

Methods: In 2017, we conducted a needs assessment survey with BC health and social care providers to determine their demand for education on specified HCV topics. The survey included: (1) a list of 23 topics (spanning overview of HCV to patient management), (2) HCV-related experience and professional category questions, and (3) a five-item HCV knowledge check (e.g., HCV vs HIV deaths, testing and follow-up). Analyses included frequencies and tests for differences in educational needs and knowledge scores across occupation, and HCV testing and treatment experience.

Results: Of 301 respondents, 86% were nurses (74% from public health, 20% community health and 15% primary care), 13% were from other professions, and 1% were physicians. Between 81-91% requested HCV pathophysiology education, >86% requested risk factors and testing education, 68-85% requested education on detailed workflow on testing, and between 71-89% requested education on HCV management, including prevention, treatment and referral process. There were significant differences in topic requests by field of nursing, years of HCV testing, and treating experience. The mean knowledge score was 34% (n=258). The percent correct responses across items ranged from 9.1% to 68.3%.

Conclusion: This needs assessment demonstrates a high demand for HCV education among various health and social care providers. The limited knowledge assessment suggests low levels of HCV knowledge, even among those experienced in HCV testing and treatment.

EPHP2.06

Are Community-based HIV Testing Interventions Effectively Aligned to Meet UNAIDS 90-90-90 Targets?

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Background: Reaching the UNAIDS 90-90-90 targets to end HIV relies on effective community evidence-based interventions that engage untested HIV+ individuals and retain them in care. Evidence through the lens of UNAIDS targets has not yet been synthesized, so knowledge on effective community-based interventions remains limited. To fill this gap, we systematically appraised evidence and classified community-based HIV testing interventions on effectiveness and success towards targets.

Methods: For the period 2007-2017, three reviewers searched eight databases, three conferences, retrieved >5000 citations, and abstracted data from 91 studies. Eligible studies were classified by intervention, populations, country income (high, middle, low), outcomes and success towards 90s. Heterogeneity in reported outcomes precluded pooling of effects. Statistically significant interventions were deemed effective, and in reporting towards the targets, >90% was considered highly successful, while 75-89% was considered moderately successful.

Results: Of 91 studies, reporting by 90s targets: 44% (first 90), 17% (second 90), 39% (third 90). By country: 31% (28/91) high, 49% (45/91) middle, 23% (23/91) low income. By interventions: community worker based (58%), integrated test/treat (19%), digital innovations (11%), educational (9%), and test campaigns (3%). In descending order of effectiveness: test campaigns (100%), educational (63%), integrated test/treat (29%), digital (30%) and community worker (26%). Reporting of effective and successful interventions lacked consistency. Only 36% (33/91) of studies were deemed successful towards the 90s. Only 11% of interventions reached first time testers. Successful interventions were community worker based in low income; educational and test campaigns in high income countries.

Conclusions: More studies need to meet UNAIDS targets, and innovative interventions are needed to engage first time testers. Evidence stratified by country and targets will inform implementation of successful interventions in comparable settings. Lastly, consistent reporting of effectiveness and success with clear metrics aligned to the UNAIDS targets will remain vital to informing policy initiatives.

EPHP2.07

Client and Provider Satisfaction with a Pharmacist-Administered HIV Point of Care Testing Program – the APPROACH Study

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Background: This presentation will report on client and pharmacist experiences with the APPROACH study, a pharmacy based HIV point-of-care testing (POCT) program piloted in Newfoundland and Labrador and Alberta.

Methods: The HIV POCT program was offered for 6 months in four community pharmacies. Clients completed pre- and

post-testing questionnaires and an optional telephone interview to provide feedback on their experiences. Provider experience was obtained through end of study pharmacist focus groups. Descriptive statistics were used to summarize questionnaire responses, and thematic analyses were performed on interview data.

Results: 122 of 123 (99.2%) clients tested completed questionnaires; 36 participated in telephone interviews. Six of seven pharmacists participated in the focus groups. Clients reported a high degree of comfort and confidence in the pharmacist tester, with nearly 100% indicating that testing should be routinely offered in pharmacies. 83% reported intention to seek testing for other STBBIs after receiving counselling. Privacy, receiving immediate results, and not needing an appointment were among the most important factors in deciding to access pharmacy testing. Clients felt pharmacy testing was less stigmatizing, however the busy pharmacy atmosphere and technical challenges with blood collection pipettes were issues cited by a few clients. Pharmacists felt well-prepared after training to offer testing and reported the program, including linkage to care and supports, worked well. They expressed high professional satisfaction with offering testing. Concerns expressed included use of the testing pipettes and the lengthy study consent process. Considerations for scalability of the program included standardizing training requirements for testers and linkage to care plans, and securing remuneration.

Conclusions: A pharmacist-administered HIV testing program was successfully implemented. Clients and pharmacists expressed very high levels of satisfaction with the program, suggesting pharmacy-based HIV testing can improve access to testing and linkage to care. An economic evaluation and scalability issues will be explored further.

EPHP2.08

Factors Associated with Offer and Patient Acceptance of Nurse-Driven HIV Screening Targeting Key Populations in Eight Emergency Departments

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Background: Combining nurse-driven targeted HIV screening and diagnostic testing has been shown to significantly improve proportions of new diagnoses in a cluster-randomized crossover trial in eight hospital Emergency Departments (EDs) of the Paris Metropolitan area (DICI-VIH trial). In this first large-scale evaluation, factors associated with provider questionnaire offer and patient acceptance of targeted HIV screening were evaluated.

Methods: A self-administered questionnaire was offered at registration over a 24-hour period to patients aged 18-64 able to give consent (i.e. eligible patients). Based on responses, triage nurses then offered patients belonging to key populations (mainly men who had sex with men, migrants from generalized epidemic areas) a rapid HIV test. ED and patient characteristics associated with provider questionnaire offer and patient test acceptance were analyzed using a logistic mixed-model.

Results: Among eligible patients, 33% were offered to complete the questionnaire (17,727/53,612). The proportion varied from 23% to 48% across EDs. The questionnaire offer decreased over time (Odds Ratio (OR): 0.76; IC95%: 0.71-0.82, 4th *vs* 1st quartile) and with higher daily patient flow (OR: 0.61; IC95%: 0.56-0.67, 4th *vs* 1st quartile). The questionnaire offer was higher on weekdays than weekends (OR: 3.77; IC95%: 3.57-3.99) and when a clinical research nurse (CRN) participated in the screening (OR: 1.31; IC95%: 1.26-1.37).

Among patients offered a test, 71% accepted (2,818/3,995). The proportion varied from 64% to 77% across EDs. Test accepters tended to be younger compared with refusers (OR: 0.76; CI95%: 0.61-0.96, for >50 y.o. *vs* 30-39 y.o.). Test acceptance decreased over time (OR: 0.75; CI95%: 0.60-0.92, 3rd *vs* 1st quartile) and increased with CRN participation (OR: 1.20; CI95%: 1.03-1.40).

Conclusions: Questionnaire offer and patient acceptance of HIV screening targeting key populations decreased over time but were boosted by CRN participation. Findings can help guide implementation of this new strategy in EDs.

EPHP2.09

Nurturing an Innovative Network in Northern British Columbia: Building Connections and Learning from a Novel Shared Measurement Evaluation

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Background: Northern Health (NH) provides health services to nearly 300,000 people dispersed across an area of 600,000 km^2 in the northern two-thirds of British Columbia (BC). In 2016, NH undertook a request for proposals to increase geographic reach of community-based HIV and HCV services beyond one urban area, where most of these services had been located historically. A total of $1.42M was awarded to 11 community-based not-for-profit and First Nations health organizations who now offer education, prevention/harm reduction, testing, case management, treatment and support services across the region.

Methods: The *Northern HIV & HCV Network* was established to facilitate sharing of learnings and best practices amongst the contracted organizations. Mentorship from longstanding HIV/HCV organizations and support from NH, the First Nations Health Authority, and the Pacific AIDS Network (PAN) was provided through quarterly meetings. NH also contracted PAN to build evaluation capacity and lead an innovative, participatory evaluation to measure the impact of community-based HIV and HCV work in northern BC. A shared measurement evaluation framework was developed and data was collected using two survey tools: a client survey for people living with or at risk of acquiring HIV and/or HCV, and a survey for the contracted organizations.

Results: Early findings suggest that the community-based HIV and HCV services positively contributed to client participants' quality of life, social connection, and experience of stigma and discrimination. In addition, the contracted organizations benefited from the shared measurement evaluation and network approach to working together. Further learnings about the development of the Network and evaluation tools will also be presented.

Conclusions: Working in a highly participatory and collaborative manner with focus on group learning rather than monitoring has created a network that is: building trust between partners, improving programs and making decisions using data, and finding opportunities for partnership and joint work.

EPHP2.10

CHAMP in Action: Critical Pathways in Translating Evidence Based Stigma Reduction Intervention to Frontline Programs Amongst Culturally Diverse Communities

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Background: HIV stigma impedes prevention, early testing and diagnosis, timely initiation of treatment and adherence, and access to inclusive care. Between 2011-2015, the Committee for Accessible AIDS Treatment (CAAT) conducted the CHAMP intervention study that engaged people living with HIV (PLHIV) and non-PLHIV in African, Caribbean, Asian and Latino communities to evaluate two interventions: Acceptance Commitment Training (ACT) and Social Justice Capacity Building (SJCB). The study demonstrated that these interventions were effective in reducing internalized and enacted stigma, and in mobilizing collective action to advocate for health equity. In 2016, an alliance of five ethno-specific AIDS service organizations secured resources to scale-up the CHAMP intervention in real-life community settings.

Methodology: CHAMP In Action is a 5-year program underpinned by a capacity building framework and GIPA/MIPA principles. Phase 1 of the program utilizes a train-the-trainer approach to engage and train staff, peer leaders and core volunteers from the partner agencies in the CHAMP interventions. The trained champions will be mentored to implement the CHAMP intervention as an integrated program and to work with PLHIV, individuals/groups vulnerable to or affected by HIV, service providers, and multi-sectoral stakeholders to reduce HIV and related stigma and to increase the effectiveness of the agencies' HIV responses.

Results: This paper reports on the application of implementation science in scaling up the CHAMP intervention. Guided by the RE-AIM framework, we will report on strategies and processes used to: (1) define and achieve the target population; (2) build capacity among agency staff and peer leaders to implement the interventions; (3) evaluate the intervention effectiveness; and (4) ensure implementation fidelity.

Implications: CHAMP In Action provides important insights into the pathways, processes and resources needed to successfully translate evidence-based stigma reduction interventions into sustainable community programming. Lessons learnt will inform broader implementation science framework for diverse communities.

EPHP2.11

Protocol And Rationale For Evaluation Of A Multi-site Drug Checking Pilot Project In Toronto, Canada

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With over 2,500 opioid-related deaths in 2016, the increasing incidence of fatal overdose is a leading cause of morbidity and mortality in Canada. Given growing concern that this is related to the presence of highly potent opioid adulterants (e.g., fentanyl) in street drugs, drug checking services (DCS) have emerged as part of a comprehensive approach to preventing overdose. DCS also represent a low-threshold approach to engaging with populations at risk of HIV acquisition or transmission that are not reached by existing services. Health Canada has committed to authorizing and funding pilot projects providing DCS at supervised consumptions sites. This study will evaluate the impact of DCS co-located with supervised injection sites (SIS) at three frontline agencies in Toronto, Ontario on overdose and overdose-related risk behaviours. The specific aims of the study are to: 1) identify trends in the composition and potency of the street drug supply in Toronto; 2) quantitatively evaluate the impact of DCS access on factors influencing overdose risk and engagement with the HIV prevention and care cascade among clients; and 3) qualitatively investigate the capacity of DCS to alter the

context for and pathways to overdose prevention among those at highest risk. A parallel mixed methods design with complementary data sources (i.e., data from chemical analysis of drug samples, quantitative intake and outtake surveys, SIS, coroners, paramedics, and qualitative interviews), followed by a meta-inference process wherein results from analyses are synthesized, is used to comprehensively evaluate the impact of DCS on a range of policy-relevant drug-related outcomes, while also adjusting for the potential impact of co-located SIS. Aligning research protocols with evaluations of DCS in British Columbia also allows for national comparisons of outcomes. The study will generate critical evidence on a novel approach to reducing the ongoing high incidence of drug-related morbidity and mortality in Canada.

EPHP2.12

Impact of PrEP on HIV Transmission Among Montréal Men Who Have Sex with Men: a Proposed Model-based Impact Evaluation

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Background: The population-level impact of pre-exposure prophylaxis (PrEP) on HIV incidence has never been empirically measured and may differ from its individual-level effectiveness due to indirect benefits. Québec was the first province to release PrEP guidelines in 2013 and uptake in Montréal has been rapid (13-15% based on preliminary surveys) among sexually active men who have sex with men (MSM). Evaluating such real-world HIV prevention programs is challenging. Mathematical models of transmission have some advantages over traditional quasi-experimental designs – such as pre-post and difference-in-difference designs – by generating estimates that account for past/concurrent interventions (testing/earlier treatment initiation) and HIV transmission dynamics.

Objective: We aim to develop an *a priori* robust evaluation framework of PrEP's population-level impact on HIV transmission among Montréal MSM.

Methods/Results: First, we will collect relevant demographical, biological, behavioral, and intervention data to parameterize a detailed mathematical model of sexual HIV transmission. PrEP use over time will be informed by cross-sectional surveys (Engage and Mobilise!) and data from 60-75% of Montréal's PrEP users from Canada's largest PrEP clinics (L'Actuel and Quartier Latin) and the *Protèges* cohort. This will enable us to account for observed levels of PrEP-associated risk compensation and scale-up of other interventions over time. Second, the model will be calibrated in a Bayesian framework to HIV surveillance data from 2002-2018 (new diagnoses/incidence assay). Third, we will simulate a counterfactual ("what-if") scenario where PrEP had not been available. Fourth, the observed and counterfactual scenarios will be compared to estimate the impact of PrEP on HIV incidence over 2013-2018. Finally, we will use Bayes factor to test the hypothesis that PrEP reduced HIV transmission.

Conclusions: Montréal has experienced rapid PrEP uptake. This proposed real-world impact evaluation will provide timely evidence on how best to scale-up this antiretroviral-based prevention strategy in Canada and elsewhere.

EPHP2.13

HIV Care and Support Services and the Treatment Outcomes of Newcomers Living with HIV in Manitoba

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Despite the overrepresentation of immigrants and refugees (newcomers) in the HIV epidemic in Canada, there is limited research on their HIV care needs and whether they achieve the full benefits of antiretroviral treatment. Using clinical health data from a cohort of people living with HIV who receive care with the Manitoba HIV program, this research project will address this knowledge gap by describing the epidemiology, clinical characteristics and treatment outcomes of newcomers living with HIV in comparison to Canadian-born persons living with HIV in Manitoba. Additionally, in an effort to better understand what services are provided to newcomers living with HIV, an environmental scan will be conducted to identify existing prevention, testing, treatment and support services available across the province. The scan will be able to outline existing gaps in the provision of HIV prevention and treatment services for newcomers. This work will provide the groundwork for future program analyses to identify service priorities for newcomers living with HIV and the community organisations, healthcare providers and policy makers in the province that provide care and support for this population.

EPHP2.14

Continuity of Patient Care Is Associated with Decreases in Hospital Readmission Among People Living With HIV: A Population-Based Study

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Background: Hospital readmission 30 days after discharge is associated with adverse health outcomes, including psychological stress and increased mortality. People living with HIV (PLWH) experience elevated rates of hospital readmission compared to the general population. While continuity of care with a healthcare provider is associated with lower rates of 30-day readmission among the general patient population, little is known about this relationship among PLWH. The objective of this study is to examine whether continuity of care is associated with 30-day re-admission among PLWH.

Methods: Using data derived from the Seek and Treat for Optimal Prevention HIV/AIDS in British Columbia cohort, we used generalized estimating equation models to examine the association between patient-provider attachment and 30-day hospital readmission. Patient-provider attachment was defined as the percentage of services provided by the physician who provided the most services in a year. Causes for hospitalizations were recorded, and we examined whether readmission was due to all cause or to similar cause as the index admission.

Results: Between April 1996, and February 2015, a total of 5122 individuals (16 498 observations) were hospitalized. 670 (13.0%) were readmitted to hospital for all cause, and 396 (7.7%) for the similar cause as the index admission. After adjusting for various demographic, behavioural, and clinical confounders, patient-provider attachment was negatively associated with 30-day readmission for all cause (OR= 0.90, 95% CI: 0.88-0.93). A second multivariable model indicated that patient-provider attachment was also negatively associated with 30-day readmission for similar cause (OR = 0.92, 95% CI: 0.88-0.95).

Discussion: Our results indicate that a strong patient-provider attachment is protective against 30-day readmission for PLWH in British Columbia. These findings support the adoption of interventions that seek to build patient-provider relationships in order to achieve optimal outcomes for PLWH, and minimize the resource and financial burden on the healthcare system.

EPHP2.15

Narrative Review of Interventions to Improve Bacterial STI Testing in Men, Particularly Gay, Bisexual and Other Men Who Have Sex (gbMSM)

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Background: Rates of bacterial sexually transmitted infections (STI) among gbMSM continue to increase in Canada and internationally. The asymptomatic presentation and suboptimal testing of bacterial STIs highlights the need for interventions.

Objective: To identify and assess effectiveness of interventions to improve bacterial STI testing in men, particularly gbMSM populations, in the literature.

Methods: Building on a published systematic review (Taylor et al., 2016 *Sex. Transm. Dis.*), we updated the search in MEDLINE to 04/2017 using the key words: STD/STI, chlamydia, gonorrhea, or syphilis. We classified interventions into three categories: A) streamlining testing for asymptomatic individuals; B) client targeted interventions; or C) provider targeted interventions. Interventions with a comparison group were categorized as very effective (absolute difference (AD) $\geq$20% or relative difference (RD) $\geq$100 %), moderately effective (AD 5-19% or RD 10-99%), or ineffective in increasing proportion tested.

Results: Of 246 citations, 42 articles discussing 48 interventions were included, with majority from Australia (n=15) and only 2 from Canada. Effectiveness was evaluated for 42 interventions with 35 categorized as effective: 21 moderately effective and 14 very effective. In category A, routinizing testing was the predominant intervention, with all 7 effective, followed by home-based testing, with 5 out of 6 effective. Eight effective interventions among various intervention types in category A detailed testing of extragenital sites, with 7 employing self-collection of anal swabs. In category B, the most common intervention was client reminders, with 6 of 8 effective, followed by 2 effective client counselling interventions. Both client incentive interventions (n=2) in category B were ineffective.

Conclusion: Heterogeneity in outcomes inhibits a meta-analysis to summarize effectiveness of intervention types. Furthermore, many published interventions, such as online-based testing (n=3), lacked a comparison group precluding assessment of effectiveness. gbMSM targeted bacterial STI testing interventions could benefit from incorporating routinized testing, home-based testing, or client reminders.

EPHP2.16

Operations Research Analysis of HIV Treatment and Testing Programs in Vancouver

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Background: The continuum of care for HIV/AIDS involves testing programs, clinical assessment, engagement in care, antiretroviral therapy, treatment support, and retention in care. An effective continuum of care has the potential to significantly impact the epidemic, because patients who are adherent on antiretroviral therapy are essentially noninfectious.

Methods: Working with care providers and public health officials in Vancouver Coastal Health, we developed a detailed compartmental (differential equation) model of the HIV care continuum, which includes testing, treatment, and retention programs. This model is coupled to epidemiological models of the HIV epidemic in men who have sex with men, people who inject drugs, female sex workers, and the general population. Data from the BC Centre for Excellence in HIV/AIDS, the Drug Treatment Program, and Vancouver Coastal Health were used for calibration and validation. We applied metaheuristic optimization methods to determine resource allocations across treatment and retention programs that minimize new HIV infections, morbidity, and mortality over five and ten-year time horizons.

Results: Model output from 2010 to 2015 showed that the Seek and Treat for Optimal Prevention of HIV/AIDS (STOP) program reduced HIV infections in Vancouver by approximately 100 cases and AIDS-related deaths by approximately 80 over this time period. Most of this impact arises from the dramatic increase in HIV testing. We show that new infections and AIDS-related deaths can be further reduced by an estimated 20 cases and 15 deaths over ten years. These gains can be achieved through optimization of treatment and retention programs, without further program investment.

Conclusions: The STOP program has been effective at reducing HIV infections, morbidity, and mortality. Quantitative operations research methods demonstrate that additional impact may be achieved within the current budget. Further investment in HIV treatment and retention programs would be cost-effective, especially if combined with program optimization.

EPHP2.17

Late Diagnosis, Delayed Presentation, and Late Presentation Among Persons Enrolled in the Ontario HIV Treatment Network (OHTN) Cohort Study (1999-2013)

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Introduction: Timely HIV diagnosis and presentation to care are important for treatment and prevention. Understanding risk factors, and the relative contribution of late diagnosis and/or delayed presentation to late presentation, could help inform the prioritization of interventions.

Methods: The Ontario HIV Treatment Network Cohort Study (OCS) is a multi-site HIV clinical cohort with linkage to diagnostic and viral load (VL) data at Public Health Ontario Laboratory. Among OCS participants newly diagnosed with HIV in Ontario from 1999-2013, we measured late diagnosis (<350 CD4 cells or an AIDS defining condition, ADC, within 3 months of diagnosis), delayed presentation (>3 months from diagnosis to care), and late presentation (<350 CD4 cells or ADC within 3 months of presentation). First VL was used as a proxy for presentation to care. We identified characteristics associated with these outcomes and explored their overlap.

Results: 1819 OCS participants were eligible for analysis. Late diagnosis (53.0%) and presentation (54.0%) were common and a quarter (23.1%) were delayed presenters. Delayed presentation decreased over time, but late diag-

nosis/presentation did not. Late diagnosis contributed to the majority (over 87%) of late presentation, and delayed presentation was similar among those diagnosed late vs. early (13.4% vs. 13.4%, p=0.99). Characteristics associated with higher odds of late diagnosis/presentation in multivariable analysis included older age at diagnosis/presentation; African, Caribbean, and Black race/ethnicity; Indigenous race/ethnicity; being a male who did not report sex with men; and being female. There were lower odds of late diagnosis/presentation among participants who had ever injected drugs. In contrast, higher odds of delayed presentation were associated with younger age at diagnosis and ever injecting drugs.

Conclusions: Late presentation is common in Ontario, as it is in other high-income countries. Our findings suggest efforts to reduce late presentation should focus on facilitating earlier diagnosis in the populations identified in this analysis.

EPHP2.18

Trends in HIV Cascade Engagement by Sex, Age and Health Region among Diagnosed People Living with HIV in Ontario, 2000 to 2015

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Background: The HIV cascade is a standardized way of measuring how well people living with HIV (PLWH) access care/treatment and achieve viral suppression, and allows for identification of gaps in care. We explored cascade indicators by sex, age and geography among diagnosed PLWH for the province of Ontario.

Methods: We developed a population-based cohort of diagnosed PLWH using a centralized public health laboratory database with records linked at the individual-level. The database contains diagnostic and viral load (VL) test results for the province and information documented on requisition forms. The cohort includes individuals who have a nominal HIV-positive diagnostic test and/or ≥1 VL test and are not lost-to-follow-up. Cascade indicators included the annual proportion of diagnosed PLWH meeting the following definitions in a given calendar year: in care (≥1 VL test); on antiretroviral treatment (documented on last VL requisition); and virally suppressed (<200 copies/ml on last VL test). Indicators were stratified by sex, age and geography.

Results: The number of diagnosed PLWH increased from 8,859 in 2000 to 16,110 in 2015 and the percent ≥45 years of age doubled from 29.1% to 62.6%. The percent female increased from 15.0% in 2000 to 20.0% in 2008, remaining stable thereafter. While cascade estimates improved over time for all ages/sexes, indicators were consistently lower for younger individuals and slightly lower for females. In 2015, the percent virally suppressed was 80.4% for males and 76.5% for females, and 64.2%, 67.9%, 76.4%, 82.2%, and 85.9% for those aged ≤24, 25 to 34, 35 to 44, 45 to 54, and 55+, respectively. In 2015, cascade estimates were generally lower in the Northern health region.

Conclusion: The population of diagnosed PLWH in Ontario has increased and aged over time. Despite improvements, there were greater gaps for younger individuals, females, and individuals residing in the North of Ontario.

EPHP2.19

Experiences and Attitudes to HPV and HPV Vaccination Among GB2M: Results from the Ontario-wide #iCruise Study

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Background: Gay, bisexual, two-spirit and other men who have sex with men (GB2M) are prioritized for human papillomavirus (HPV) prevention due to their higher risk for HPV-related diseases, particularly anal cancer. In 2016, Ontario introduced a provincial program to provide free vaccine to young GB2M (≤26 years).

Objectives: To assess the experience and attitudes of GB2M on HPV and HPV vaccination.

Methods: #iCruise is an Ontario-wide mixed-methods study of GB2M seeking and accessing sexual health information online. GB2M were recruited through websites and mobile socio-sexual apps and completed the baseline questionnaire between July-October 2017. Items included demographics, experience, and attitudes towards HPV vaccination in different scenarios using Likert scales. We compared younger men (≤26) to older men (>26) using cross-tabulations and Pearson's chi-square tests.

Results: 575 participants completed the baseline questionnaire, and ranged in age from 16-89 years, with 42.6% aged 26 and under. The majority had heard of HPV (95.1%) and the HPV vaccine (82.1%). A higher proportion of younger versus older men reported discussing the vaccine with a health professional (41.2%[95%CI:35.0-47.7] vs 30.9%[95%CI:26.0-36.2],p=0.035) and received 1+ doses of the vaccine (26.5%[95%CI:21.1-32.5] vs 15.2%[95%CI:11.5-19.5],p<0.001). Of those who had received at least one dose, 50.4% had received all three doses. Among unvaccinated men of all ages, the proportion reporting being likely/

very likely to get the vaccine was 81.9% if the vaccine was free but dropped to 8.5% if they had to pay $500.

Discussion: GB2M showed a willingness to get vaccinated, particularly if was free. Younger GB2M were more likely to have discussed the HPV vaccine with a provider and to have received it, likely reflecting the availability of free vaccine for this group. Despite the higher vaccine uptake in young GB2M, approximately three-quarters had not been vaccinated, suggesting a need for increased vaccine awareness and access.

HIV Prevention for Key Populations

La prévention du VIH dans les populations clés

EPHP3.01

Adapting an Evidenced-Based HIV Prevention Intervention for Street-Connected Young People in Western Kenya

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Background: Despite facing numerous social, health, and economic inequities, no evidence-based interventions (EBI) exist for street-connected young people (SCY) in low- and middle-income countries (LMICs). We sought to identify, adapt, and pilot an evidenced-based HIV prevention intervention that may be suitable, feasible, acceptable, and potentially effective, for SCY in Kenya.

Methods: From May to August 2017 in Eldoret, Kenya, we adapted the Stepping Stones and Creating Futures HIV Prevention intervention drawing on a modified ADAPT-ITT model using the following 7-step process: 1. Assessment, 2. Decision, 3. Administration, 4. Production, 5. Topical Experts, 6. Integration, 7. Testing. We used community-based participatory methods with four Peer Facilitators and 24 SCY, aged 16 to 24 years, who participated in adapting the intervention for the new context.

Results: At the inception of this project, a matched-savings program was added to the intervention to further address structural drivers of HIV in this context. To adapt and facilitate the program, we hired four young people as Peer Facilitators, who had been or currently were connected to the streets. The Peer Facilitators experienced the full program as part of their training and hosted 4 mock facilitation sessions. We engaged SCY through community meetings to elicit preliminary ideas about the program. Each location where SCY congregate nominated a representative to participate in focus group discussions and working groups to adapt the program. Through these processes numerous adaptations came forth that were integrated into the adapted intervention that was piloted.

Conclusion: Our rigorous adaptation process using community-based participatory methods and a modified ADAPT-ITT model demonstrates that it is feasible to adapt existing EBI for SCY in LMICs. Engaging SCY in the adaptation of the curriculum, ensured the curriculum was responsive to their needs, relevant to the street context, and respected their right to participate in the research process.

EPHP3.02

High Seroconversion Rates Following PrEP Discontinuance in a Montreal Clinic

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Introduction:

Variations in individual PrEP use have been described by the seasons of risk theory; whereby patients may start and stop PrEP episodically. However, measures of rates of episodic PrEP use, reasons for PrEP discontinuation and rates of seroconversion following PrEP stops are scarce.

Methods: We aim to measure rates of temporary and permanent PrEP discontinuations, describe stop reasons and measure seroconversion rates subsequent to stops using the l'Actuel PrEP cohort (Montreal). We included patients who had initiated PrEP and returned for ≥1 follow-up visit prior to September 2017 (N=1258). Person-time at risk was calculated from stop date to date of seroconversion or censored at last negative HIV test among patients maintained in care.

Results: Our PrEP cohort measured 450 consistent users (36%), 114 users (9%) who temporarily stopped and re-initiated PrEP, 214 individuals who permanently discontinued (17%) and 480 individuals who have been lost to follow-up for ≥6 months (38%). HIV incidence following discontinuation was 3.9 cases per 100 PY. Among individuals who discontinued PrEP, the most commonly reported stop reasons were side effects (14%), financial reasons (9%), individual preference (7%), and changes in sexlife, such as entry into a stable relationship with seronegative partner (13%), entry into relationship with seropositive undetectable partner (4%), break-up with seropositive partner (4%) or sexual abstinence (10%).

Discussion: For some, PrEP use may be a transient rather than constant HIV prevention method. The high rates of seroconversion following PrEP discontinuance indicate the need for clinical support based on contextual lifestyle factors that may lead individuals to stop PrEP while remaining at high risk for HIV infection. Increased risk counseling and resources to reduce loss to follow-up for PrEP users are essential. In line with Montreal's Fast-Track City Initiative, sup-

port of PrEP and combined prevention measures remain key to ending the epidemic by 2030.

EPHP3.03

Assessing Engagement in Primary Care Over Time Amongst High-risk Men Who Have Sex with Men: Opportunities for Pre-exposure Prophylaxis Initiation

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Introduction: Men who have sex with men (MSM) at highest risk for HIV acquisition can be identified through STI diagnosis or clinical risk scores (e.g. HIRI-MSM). High-risk MSM should be offered pre-exposure prophylaxis (PrEP), yet it is unclear if these individuals receive ongoing primary care. We evaluated uptake of primary care services amongst MSM enrolled in Vancouver, Canada.

Methods: MSM enrolled 02/2012-/02/2015 were eligible if they were HIV-negative at baseline, had available HIRI-MSM and STI history. Study visits occurred every 6 months until 02/2017. High-risk was defined as recent rectal STI or HIRI-MSM ≥10 . Self-reported engagement with a regular primary care physician, and disclosure of male partners to their physician was recorded. Multivariable multi-level models for each risk group adjusted for sexual identity, ethnicity, education, income level and age were conducted.

Results: Overall 551 individuals were included with median age 29 years (Q1,Q3:24,39). At baseline 56% were engaged in regular primary care, and of these individuals 74% had disclosed MSM status. For those with rectal STI (2.5%), 50% were engaged in primary care at baseline. For those with HIRI-MSM ≥25 (10.7%), 51% had primary care at baseline. Engagement increased over time among all participants (Odds Ratio [OR]=1.19, 95%CI:1.10-1.29 per study visit) with 70% reporting primary care at last visit (68% HIRI≥10, 88% HIRI≥25 and 71% with rectal STI). After controlling for demographics, in multivariable models neither HIRI >10 or HIRI-MSM ≥25 were associated with regular primary care engagement; while recent rectal STI diagnosis was associated with lower odds of engagement in primary care (aOR=0.58, 95%CI:0.34-0.98).

Conclusions: Engagement in primary care increased over time, but a significant proportion of MSM did not have primary care by end of followup. PrEP scale-up may require access through sexual health clinics for those not engaged with, or out to a primary care provider

EPHP3.04

Role of Overdose Prevention Sites in the Broader Response to Drug-related Harms? Insights from the Toronto Overdose Prevention Site

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Introduction: The Toronto Overdose Prevention Site (OPS) is a volunteer-run, unsanctioned OPS in Moss Park, Toronto. It opened in August 2017 in response to dramatic increases in opioid overdose mortality. While supervised injection services are currently approved or open in 8 Canadian cities, over 20 OPS have also opened, including sanctioned OPS in BC and unsanctioned ones in Ontario. While OPS are primarily framed as a means to address overdose-related morbidity and mortality, we explore the role of these low-threshold services in the broader response to health-related vulnerabilities among people who inject drugs.

Methods: We present data from the first 4 months of site operation; participants include all people accessing injection monitoring at the Toronto OPS from August 19th to November 30th, 2017. Anonymous data, including age, gender, drugs injected, overdose frequency, and intervention during overdoses, were collected and analysed.

Results: 2933 visits to the injection tent occurred; 66.5% of clients were male, 33.5% female. Self-reported drugs being injected were: fentanyl (33.3%); heroin (20.0%); "down" (unspecified opioid) (15.5%); and hydromorphone (10.4%). Overdose occurred in 3.4% of all recorded injections; 52.2% occurred after fentanyl injection. Overdoses were treated with naloxone in 40% of the cases, and with oxygen, monitoring and/or stimulation in 60% of the cases. No one accessing the site died. No significant gender difference was found in overdose rates.

Conclusions: OPS are an effective low-barrier intervention in a drug poisoning and overdose crisis. They engage with marginalized individuals who may be particularly vulnerable to multiple drug-related risks, including overdose, and HIV and hepatitis C transmission. Of note is the proportion of fentanyl use reported; its pharmacological characteristics, including a shorter duration of action, may lead to more frequent injection, increasing the potential for HIV and hepatitis C vulnerability; however, OPS utility in HIV and hepatitis C prevention remains underexplored.

EPHP3.05

Awareness of HIV Pre-Exposure Prophylaxis Amongst Canadian Primary Care Physicians Attending a Continuing Medical Education Conference, Vancouver, Canada.

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Introduction: HIV Pre-Exposure Prophylaxis (PrEP) is recommended for at-risk men who have sex with men and other populations in Canada. Despite its efficacy, its uptake remains low. The lack of knowledgeable care providers may serve as a system-level barrier to PrEP scale up. We undertook to evaluate PrEP knowledge amongst primary care physicians attending a large continuing medical education (CME) conference in Vancouver, Canada.

Methods: Attendees at an annual Family Medicine CME Conference were offered participation in an online survey in November 2017. Participants completed baseline demographics, Likert-scale questions assessed PrEP awareness, comfort in assessment for PrEP, and preferred options for future PrEP-related CME .

Results: Overall 67 primary care providers (88% physicians, 10% nurse practitioners) completed the survey (4% of attendees). Amongst respondents, 61% were female (median age 37, interquartile range 31 – 48.5 years), and 58.2% had been in practise for <10 years. A majority were from British Columbia (55%) with 17% from Alberta and 10% from Ontario. Overall 64% reported prior knowledge of PrEP. Amongst respondents (n=43) 30.3% rated their PrEP knowledge as poor/very poor, and 39.5% rated it as fair. Overall only 15% reported ever prescribing PrEP. Only 27% rated themselves as completely comfortable with: assessing sexual risk activities for PrEP, 17% in discussing PrEP efficacy, 13% in discussing side effects of PrEP and 22% were completely comfortable monitoring someone on PrEP for HIV. A majority of providers (78%) indicated that additional education would increase PrEP prescribing. Preferred methods of education were online modules (38%), local/national conferences (28%) and webinars (19%).

Conclusions: A small number of primary care providers attending a family medicine conference completed an awareness PrEP survey. Of those most had some knowledge but few individuals had prescribed PrEP. Further CME interventions are required to support primary care providers for future PrEP scale up.

EPHP3.06

The Role of Sexual Networking with People Who Inject Drugs in HIV Transmission Among Sex Workers: the Case of Pakistan

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Background: The rising in HIV incidence and prevalence among sex workers(SWs) in Pakistan may partly be due to their elevated risk exposure through sexual contact with people who inject drugs(PWIDs), among whom the epidemic is already well-established. This study examined the role of sexual mixing with PWIDs in HIV transmission among SWs in Pakistan.

Methods: We developed a mathematical model of HIV transmission and fitted to behavioural and biological surveillance data collected among key populations(KPs) from 17 cities in Pakistan in 2011. We used information from KPs, including whether or not they had PWID-SW sexual relationship within the past 6 months, and HIV prevalence within each KP to inform the model. We estimated the incidence and proportional transmission of HIV among SWs attributed to sex with PWIDs in 2011-2012.

Result: Of 16,644 KPs(70.5% SWs, 29.5% PWIDs) surveyed in 2011**,** 2,158 KPs(13.1%) had engaged in sex with someone from a different risk group(i.e., SWs with PWIDs, or conversely, PWIDs with SWs) within the previous 6 months. The overall weighted prevalence among PWIDs who had sex with SWs, and those of female sex workers(FSWs) and transgender/male sex workers(T/MSWs) who had sex with PWIDs was 34.9%, and 3.6% and 8.9%, respectively. It is estimated that nearly 18.2%(CI: 9.0%-33.0%) and 19.5%(CI: 16.4%-25.5%) of HIV incidence among FSWs and T/MSWs, respectively, is attributed to sex with PWIDs. More than half of FSWs with HIV(62.6%; range: 37.4%-81.1%) and nearly three-quarter of T/MSWs with HIV(74.2%; range: 63.6%-80.6%) are from the cities of Karachi, Sukkur and Larkana, all in the Province of Sindh.

Conclusions: Nearly one-in-five infections among SWs in Pakistan are attributable to sexual transmission from PWIDs, though the proportion varies substantially by region. Any epidemic appraisal to prioritize SWs needs to incorporate monitoring of sexual mixing patterns with PWIDs to better plan HIV prevention programs.

EPHP3.07

Applying a Conceptual Model of Access to Explore Access to PrEP in a Population-based Sample of Gay, Bisexual, and Other Men Who Have Sex with Men (gbMSM)

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Background: Pre-exposure prophylaxis (PrEP) is an emerging HIV prevention strategy utilised by gbMSM. We describe factors related to PrEP-uptake amongst HIV-negative participants of the Engage study in Montreal.

Methods: Engage is a cross-sectional study in Montreal, Vancouver and Toronto. We recruited cisgender and transgender men ≥16 years who had sex with another man in the past 6 months (P6M) via respondent-driven sampling (RDS) to undergo HIV/STI testing and a computer-assisted self-interview. Questionnaire items were developed to measure user-perspectives of the Levesque model of access to health services (2013). The current analysis describes the first steps of access (ability to perceive need for, to seek out, to reach) to PrEP, and the proportion of participants meeting the recommendations of the 2017 Canadian PrEP guidelines. Proportions are not RDS-weighted.

Results: As of September 2017, 514 participants were enrolled in Engage-Montreal, 384 (75%) were confirmed HIV-negative, and 315 (82%) of these were aware of PrEP. In P6M, among the 315 PrEP-aware HIV-negative participants, 126 (40%) perceived their need for, 61 (19%) sought-out, and 49 (16%) reported lifetime use of PrEP. Possible factors contributing to the observed trajectory are presented in Table 1. Of note, 79% of PrEP-aware participants who met Canadian PrEP recommendations had never taken PrEP in their lifetime.

Table 1: Steps and Factors related to Levesque trajectory of access, applied to PrEP, amongst participants of the Engage-Montreal study

Questionnaire Item	Proportion of PrEP -aware confirmed HIV-negatives (n=315)	
	n	%
Steps in the Levesque trajectory of access to PrEP		
Perceived need for PrEP: In the P6M, have you felt the need to go on PrEP? *(Response: likely or very likely)*	126	40
Sought-out PrEP: In the P6M, have you tried to go on PrEP? *(Response: yes)*	61	19
Reached PrEP: Have you ever taken PrEP yourself? *(Response: yes)*	49	16
Factors relating to accessing PrEP		
How would you assess your current risk of getting HIV? *(Response: likely or very likely)*	24	8
"I know enough about PrEP to tell if it's right for me or not." (Response: agree or strongly agree)	166	53
"I don't feel that I am at high enough risk to use PrEP." *(Response: agree or strongly agree)*	145	46
In your opinion, how effective is PrEP at preventing HIV infection? *(Response: effective or highly effective)*	202	64
"I am worried about the short- and long-term side effects of taking PrEP." *(Response: agree or strongly agree)*	190	60
"PrEp is well-perceived in the community" (Response: agree or strongly agree)	131	42
"I am worried about being negatively judged for taking PrEP" *(Response: agree or strongly agree)*	75	24
"Clinics where I could get PrEP are too far away." *(Response: agree or strongly agree)*	24	8
"I know where to go to get a prescription for PrEP." *(Response: agree or strongly agree)*	187	59
At this time, how easy overall would you say it is for you to access PrEP? *(Response: easy or very easy)*	185	59

Conclusion: Preliminary findings suggest that PrEP-awareness is high among this Montreal population-based sample of gbMSM. Improving self-perception of HIV risk, PrEP literacy and the perception of PrEP in the gbMSM community as a viable option for HIV prevention could increase uptake.

EPHP3.08

Interest in and Use of PrEP Among MSM in Montreal: Characteristics of Early Adopters and Considerations for Expanded Use

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Background: PrEP constitutes an important new option to increase the effectiveness of combination prevention, particularly among MSM for whom options such as condoms are less suited their sexual lifestyles.

Method: Between May 2016 and January 2017, 1028 MSM in the greater Montreal region responded to a survey to gather data on knowledge, interest in, and use of risk reduction strategies. For HIV-negative and HIV-unknown respondents (n=761), a dependent variable was created based on: 1) interest in using PrEP (yes or no); and 2) ever having used it (yes or no). Multinomial logistic regression was performed with independent variables that were significant at $p<0,05$ for bivariate analysis.

Results: Half (53%) of participants have little or no interest in using it PrEP and have never used it (NINU); 5% have little or no interest in using it, but have already used it (NIU); 32% are interested in using it and have never used it (INU); and 10% are early adopters who are interested in and have already used it (IU). Compared to NINUs, INUs are characterized by: living on the island of Montreal rather than outlying suburbs (aOR: 2.7, CI95% 1.66-4.25). IUs are characterized by: having an income of $40,000 or more (aOR: 2.5, CI95% 1.31-14.77); having had an HIV-positive partner in the year with an undetectable viral load (aOR: 6.5, CI95% 2.81-15.24); having access to a health professional on a regular basis (aOR: 3.4, CI95% 1.02-11.14); having been tested for HIV or STBBI in the last 12 months (aOR: 4.9, 95% CI 1.26-19.31); and having had an STBBI in the last 12 months (aOR: 2.9, CI95% 1.30-6.58).

Conclusion: Early adopters correspond to the criteria for PrEP use in clinical guidelines. To expand PrEP use, interventions are needed to reach other MSM who are not currently interested but could benefit.

EPHP3.09

A Longitudinal Analysis of Cannabis Use and Mental Health Symptoms Among Gay, Bisexual, and Other Men who have Sex with Men (gbMSM) in Vancouver

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Background: Cannabis use is highly prevalent among GBMSM. Anecdotally, some may use it to self-medicate symptoms of anxiety and depression. We examined factors associated with regular cannabis use and associations with symptoms of anxiety and depression among GBMSM in Vancouver.

Methods: We collected data on demographics, drug use, and symptoms of anxiety and depression every six months using a self-administered computer-based survey among a cohort of sexually-active GBMSM aged ≥16 years from February 2012-February 2017. The survey included the validated Hospital Anxiety and Depression Scale (HADS) for current symptoms. A nurse-administered questionnaire asked about previous mental health diagnoses. We examine factors associated with regular use of cannabis (≥weekly in the previous 3 months) using multivariable generalized linear mixed models (GLMM). Among individuals who reported being ever diagnosed with anxiety or depression/bipolar disorders, we examined associations with abnormal scores (≥11) on the HADS anxiety or depression sub-scales using GLMM with regular cannabis use forced into models.

Results: We enrolled 774 participants of whom 223 (28.8%) self-reported as HIV positive. 250 (32.3%) reported regular cannabis use, 200 (26.4%) had ever been diagnosed with an anxiety disorder, and 299 (39.3%) had ever been diagnosed with depression or bipolar disorder at baseline. Regular cannabis-use was positively associated with HIV seropositivity (aOR=2.23; 95%CI:1.40-3.54) and ever being diagnosed with a mental health disorder (aOR=1.52; 95%CI:1.00-2.31). Among participants diagnosed with anxiety disorder, regular cannabis use was not associated with abnormal HADS anxiety scores (aOR=1.12; 95%CI:0.67-1.88). Among those diagnosed with depression or bipolar disorder, regular cannabis use was not associated with abnormal HADS depression scores (aOR=0.96; 95%CI:0.59-1.58).

Conclusions: Regular cannabis use was more common among HIV-positive gbMSM and those diagnosed with a mental health disorder. However, we did not observe an association with regular cannabis use and symptomatology for anxiety and depression among those diagnosed with these conditions.

EPHP3.10

The Investigaytors 2017: Training Young Gay, Bi, Queer and Trans Community HIV Epidemiologists [illegible]tario

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Background: Epidemio[illegible]nic [illegible]onitoring of the sexual health of gay, bisexu[illegible]qu[illegible]and trans (GBQT) communities is often [illegible]d[illegible] "surveillance" communicating results in stig[illegible]zi[illegible]ways. Modelled after a program develope[illegible]by [illegible]Community-Based Research Centre for Gay Me[illegible]H[illegible]th in Vancouver, a diverse volunteer group of GB[illegible]T y[illegible]th ([illegible]es 18 to 29) were mentored in Toronto to do [illegible]ative work toward proposing a sustainable, co[illegible]y-responsive periodic monitoring survey for GBQT m[illegible], the first of its kind in Ontario.

Activities: The *Investigaytors* met 48 times in person for one year, each Tuesday evening, and received over 114 hours on instruction by a volunteer faculty of academics and community leaders. Curricular content included basics of HIV epidemiology, research methodology, interviewing, and presentation skills, selected topics in LGBTQ2S history from an epidemiological standpoint, and basics of knowledge transfer and exchange (KTE). Social gatherings and outings to GBTQ sexual health related events also took place. To apply their learning, the *Investigaytors* conducted 10 interviews to well-established epidemiologists and analyzed the data to identify best practices in implementing a periodic sexual health monitoring for GBQT men in English-speaking countries.

Program Evaluation: Seven *Investigaytors* completed the program. Their learning and progress in acquiring knowledge and skills were measured at baseline and pre-post-test points using one self-reported instrument (ranging from "novice" to "experts") and one the civic skills measure (steps toward leadership). Two focus groups were also conducted to assess key features of the program.

Results: Most *Investigaytors* self-reported an increase in knowledge, skills and experiential areas, an enhanced team spirit and engagement with the GBTQ communities; they also reported having developed a critical lens towards GBQT men's health research.

Conclusions: Following the success of the pilot cohort, a new cohort of thirteen *Investigaytors* has been recruited to work in a separate but related community-based epidemiology project.

EPHP3.11

Multi-Level Barriers to HIV Testing among Young Heterosexual African Migrant Men in Ottawa

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Background: Little research exists about experiences of HIV testing in young heterosexual African migrant men (YHAMM) (18-29 yrs) from HIV endemic countries. **Objective:** To examine barriers to HIV testing in YHAMM (18-29yrs) from HIV endemic countries in Ottawa.

Methods: Conducted 20 semi-structured interviews with YHAMM and women (18-29yrs); 8 key informant interviews with community health service providers in Ottawa, and a scoping review on psychosocial outcomes and their measurements in newly HIV negative and positive diagnosed patients reported in 16 published studies (2007-2017). A scoping review can provide a range of knowledge on a topic, identify research gaps or recommend future research.

Results: 1. The scoping review revealed variations in psychosocial outcomes at multiple levels: mental (emotional/cognitive/spiritual) and social (relational, material, symbolic) using various measurements, complicating cross-examination of findings. 2. Drawing on multiple personal and social experiences, newcomers (5years or less in Canada) among young men participants expressed more fear and lower HIV risk perception compared to young women participants. 3. Community health service providers face multi-level challenges in offering HIV testing, despite minimal structural barriers to HIV testing, credible technology and very strong care and support services. Challenges include working alone (outreach HIV testers), continuing stigma, logistical problems in accessing complex systems compounded with support service providers' experiences of racism.

Conclusions: Multi-level pathways or experiences increase or reduce fear of HIV testing in YHAMM. The study illustrates need for: Debate to agree on a core set of psychosocial outcomes following HIV testing to clarify reporting outcomes crucial for quality improvement. Further research to assess the diverse needs of YHAMM to inform the design of relevant HIV testing interventions. Multi-level psychosocial interventions to alleviate fear. An inclusive gender sensitive policy of "Sexually Transmitted Disease Testing" essential to reduce fear of "HIV testing", implying more outreach HIV Testers, training and facilitation.

EPHP3.12

Differences and Similarities in HIV and STI Testing and Prevalence by Race/Ethnicity Among a Representative Sample of Men Who Have Sex with Men in Vancouver, BC

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Background: Race is a social determinant of health rarely used as a primary lens in work with men who have sex with men (MSM) despite ethnicity-related HIV/STI risk and prevalence variations. We sought to examine HIV-related behaviours and health service access among ethnic minority MSM in Vancouver.

Methods: We used respondent-driven sampling (RDS) to recruit 774 MSM ≥16 years in Vancouver from 2012-2017. Participants completed computer-assisted self-interviews assessing HIV/STI risk and nurse-administered HIV/STI testing, and were grouped by self-identified ethnicity. Risky sex was defined as any condomless anal sex with a serodiscordant/unknown status partner in the past 6 months. RDS-weighted population parameters were calculated and univariate multinomial logistic regression assessed differences by ethnicity.

Results: Median age was 34 years (Q1,Q3:26,47). Population parameters are presented in **Table 1**. We found no differences in risky sex, HIV testing, or STI testing. There were no significant differences found between Indigenous and White MSM. Asian MSM were significantly less likely to be HIV-positive (OR=0.46; 95%CI:0.24-0.88), and to report recent (OR=0.11; 95%CI:0.02-0.87) or lifetime STI diagnoses (OR=0.37; 95%CI:0.23-0.61) than White MSM. Latino MSM were less likely to have a family doctor (OR:0.32; 95%CI:0.16-0.64) and Asian MSM who had a family doctor were less likely to have disclosed male sexual activity (OR:0.32; 95%CI:0.16-0.62) than White MSM.

Conclusions: There was much heterogeneity in results by ethnicity, both in terms of population proportions and evaluated inequities, highlighting the need for ethnoculturally-competent health services, and the importance of community-specific consultation, engagement and nuance in public health research.

Table 1: HIV and STI Testing and Prevalence by Race/Ethnicity (n=774)

	White (n=585, 75.5 %)		Indigenous (n=50, 6.5%)		Asian (n=74, 9.6%)		Latino (n=35, 4.5%)		Other (n=30, 3.9%)	
	n	RDS%	n	RDS%	n	RDS%	n	RDS%	n	RDS%
Self-reported HIV Positive	173	27.8	21	43.2	12	17.8	7	15.7	7	26.5
Risky Sex	226	34.0	17	46.6	20	29.1	19	61.4	9	19.5
Lifetime HIV Test	551	91.9	50	100.0	68	92.5	33	96.6	28	85.6
Recent STI testing (p6m)	309	55.4	26	54.9	36	55.2	18	63.0	15	52.3
Recent STI diagnosis (p6m)	61	9.7	5	12.8	1	0.5	6	9.5	5	16.1
Lifetime STI testing	535	89.0	48	92.3	62	77.9	33	97.8	26	84.3
Lifetime STI diagnoses	358	55.4	32	61.6	28	32.1	21	53.7	20	78.1
Has a Doctor	409	70.5	32	53.3	46	64.5	15	25.4	23	71.3
Out to Doctor	345	80.8	27	76.4	29	57.1	14	97.9	19	75.6

Note:
RDS%= Respondent-driven sampling adjusted percentages;
p6m=past 6 months;
Other = Participants that self-reported ethnicities other than the 4 largest groups.

EPHP3.13

Access for All: Expanding PrEP Discussions in Canada Beyond Gay Men

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Rationale: Community engagement and capacity building are critical for realizing the HIV prevention potential of PrEP in Canada. To date, this work has been led by gay, bisexual and other men who have sex with men (GBMSM) and GBMSM-focused organizations. CanPrEP, a national alliance of PrEP advocates, recognized that other groups disproportionately affected by HIV -- people who use drugs, people who have been imprisoned, Indigenous communities, African, Caribbean and Black people, and women from these populations -- have largely been excluded from PrEP awareness-raising and dialogue.

Methods: The Access for All project aimed to support local, front-line organizations across Canada working with these priority populations to facilitate PrEP discussion forums to engage communities in conversations about PrEP and to pilot processes/resources for further engagement and education with these populations. We recruited

seven organizations and trained local facilitators using a customizable facilitation framework. In total, 154 participants were engaged over Summer 2017. Local facilitators took detailed notes and participated in pre-/post-forum webinars and debrief sessions.

Results: Two-thirds of the participants had never before heard about PrEP. They raised population-specific questions (e.g., access in prisons, interactions with illicit drugs, use during pregnancy) and common sources of confusion (e.g., relation to U=U message, PEP vs PrEP). Key messages highlighted by participants included:

- PrEP education must incorporate cultural norms around sexuality, health decision making, medicines
- PrEP puts the power of prevention/protection in the hands of the uninfected person
- people who need PrEP most have been largely exluded from PrEP discussions, and are least likely to be able to access PrEP due to poverty, marginalization, stigma

Conclusion: While PrEP has the potential to promote health equity, conversely a lack of PrEP information, access and uptake will almost certainly further entrench existing health inequalities experienced by these populations.

EPHP3.14

Recommended Models for Introducing Safer Consumption Sites in Nova Scotia

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Background: With almost 420 opioid-related deaths between 2011 and 2017, Nova Scotia is facing an increase in opioid drug misuse and overdoses. The provincial government formed a leadership committee in 2016 to address the opioid crisis, along with various working groups, including one focused on harm reduction (HRWG). In 2017, AIRN was commissioned by the HRWG to prepare a report including recommendations for preferred provincial models for introducing safer consumption sites (SCSs).

Methods: Two key data sources were used to assess needs, gaps, challenges, feasibility and acceptability of introducing SCSs in Nova Scotia and to develop recommendations for preferred provincial models: (1) Literature review on SCS best practices and delivery models nationally and internationally; and (2) Consultations with 54 service providers, provincial-level stakeholders, and people who use drugs (PWUD).

Results: Respondents attributed Nova Scotia's opioid crisis to four main factors: (1) Social determinants of health; (2) Opioid prescribing practices; (3) Inadequate & ineffective pain management; and (4) Addiction treatment bottleneck. They strongly supported introducing SCSs in the province, highlighting that they save lives and can link PWUD to other critical services. SCSs need to be coordinated within an equitable province-wide systems perspective, spanning the range of other harm reduction, addiction, mental health, and social services needed by PWUD. SCSs must build on the expertise of existing harm reduction CBOs; be flexible by location/context as appropriate; work to address stigma; and incorporate rigorous monitoring/evaluation. Staffing should include health and social service professionals, along with a strong presence of people with lived experience.

Conclusions: A phased approach to establishing three different SCS models (integrated, mobile and embedded) across multiple sites in Nova Scotia is recommended. An implementation team informed by a panel of PWUD and harm reduction experts will be instrumental to effectively moving this critical service forward.

EPHP3.15

The Potential to Avert HIV Incidence in MSM Initiating ART with Integrase Inhibitors

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Background: Integrase strand-transfer inhibitors (INSTI) represent one of the most efficacious classes of antiretroviral (ART) drugs. Our objective was to estimate the amount of potential averted HIV incidence from ART-naïve MSM individuals initiating ART with INSTI regimens, considering different risk profiles and accounting for different stages of HIV infection at ART initiation.

Methods: We used two empirically-calibrated mathematical models that calculate HIV transmission risk from viral load to estimate the amount of averted incidence from the reduction in cumulative transmission risk when initiating ART on INSTI regimens, averaged over the two models. The MSM population was stratified by level of HIV transmission risk based on the US Centre for Disease Control HIV Incidence Risk Index for MSM (HIRI-MSM). Given that the acute and AIDS stages of infection are linked to high rates of transmission, we further subdivided the population by stage of HIV at ART initiation.

Results: Initiating HIRI-MSM≥25 individuals on INSTI-based regimes is estimated to avert between 0.64 (chronic stage) and over 3 (acute and AIDS stages) incident cases/100 person-years (PY). Individuals with HIRI-MSM<20 would avert less than 0.5 incident cases/100 PY independent of stage, and individuals in the chronic stage would avert less than 0.7 incident cases/100 PY independent of HIRI-MSM risk level (Table).

Conclusions: Initiating individuals on INSTI-based regimens has the potential to avert incident cases when compared to other regimens, but the potential gains are highly dependent on the individual's risk behavior and the stage of HIV at the time of ART initiation.

Table: Averted incident cases per 100 PY in each HIRI-MSM risk group, by stage of HIV at ART initiation

		Stage of HIV at ART initiation		
		Acute	Chronic	AIDS
HIRI-MSM range	<10	0.00	0.00	0.00
	10-19	0.41	0.08	0.43
	20-24	1.26	0.26	1.32
	≥25	3.14	0.64	3.28

EPHP3.16

Évaluation d'une approche décentralisée pour le dépistage du VIH/HCV dans des communautés provenant de pays endémique à Montréal : Caraf Mobile

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Problématique : Au Québec, les personnes provenant de pays endémiques représentent la deuxième population la plus affectée par le VIH. Chez celles-ci, l'absence de lien de confiance avec le système de santé semble être un des obstacles au diagnostic précoce.

Objectifs : Offrir le dépistage du VIH et de l'Hépatite C (VHC) via une unité mobile qui va vers les populations ciblées (Haïti, Caraïbes et Afrique).

Méthode : Déploiement d'une unité mobile se déplaçant dans des quartiers à forte prévalence des populations ciblées. Solliciter 2500 participants, afin d'en dépister 1000. Le test VIH rapide (INSTI VIH-1/VIH-2) ainsi qu'un prélèvement sanguin pour la sérologie du VIH et de l'hépatite C sont effectués et un questionnaire sociodémographique est administré.

Résultats préliminaires: 3401 individus ont été sollicités. Sur 681 participants, on note 4 tests rapide du VIH positifs, dont 2 cas connus, 1 nouveau cas et 1 cas non-confirmé par le test de 4ième génération ainsi que 7 cas positifs au VHC. Les participants étaient majoritairement des hommes (66%), hétérosexuels (97%), noirs (82%), âgés en moyenne de 34 ans, provenant d'Haïti (44%). 48% se faisaient dépister pour la première fois. 47% estiment ne pas être à risque car ils n'ont qu'un seul partenaire et 35% parce qu'ils n'ont pas de relations sexuelles non protégées. 74% ont accepté de passer le test rapide pour connaître leur statut et 90% ne se seraient pas fait dépister si on ne leur avait pas proposé un test rapide via l'unité mobile.

Discussion: L'approche mobile a permis d'offrir le dépistage à une population réticente à aller vers le système de santé et d'engager un dialogue sur l'importance du dépistage. Le taux de positivité est en-deçà du taux attendu. Il sera important de réévaluer les circuits couverts afin de mieux cerner les populations à plus haut risque.

HIV Program Science

La science dans l'élaboration des programmes sur le VIH

EPHP6.01

Adapting Methods of Key Population Mapping and Enumeration to Inform HIV Prevention Programming for Adolescent Girls and Young Women

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To be effective, HIV prevention programs need to know the size of the focus population, and where and how to deliver services to individuals in that population. HIV prevention programs for female sex workers (FSW) generally do not reach young FSW and other young women engaging in informal sexual exchange.

The standard programmatic mapping method has been used to geographically locate FSW hotspots, validate their activity as FSW hotspots and estimate population size. We describe a modified mapping approach conducted in Mombasa, Kenya in 2014 that aimed to understand the numbers and mixing of young women visiting FSW hotspots to seek sex work (SW) clients, and transactional sex (TS) and casual sex (CS) partners. This paper will discuss how venue profiling was enhanced to glean this new information. It will report on the number and typology of identified FSW hotspots, and population size for all three groups (SW, TS, CS). Some key findings were that 52% of the estimated FSW population were young (14-24 years); and that young FSW, and young women seeking TS and CS partners, represented 4.9% and 7.7% of the general female population in the same age group. We will also compare FSW hotspots that were known and unknown to the local HIV prevention program, as well as compare mapping results between the current 2014 and the previous 2012 rounds, to draw inferences on the permanency of FSW hotspots and its association with fluctuation in the FSW population size in Mombasa.

Mapping, with venue profiling and population enumeration, should be incorporated as routine parts of HIV prevention programs, with adaptations to understand the local geographical risk context including potential overlapping networks, sexual or otherwise, within these locations.

The mapping findings provide an innovative approach to deliver services to individuals who are unreached by existing HIV prevention programs.

EPHP6.02

Towards comprehensive monitoring systems for HIV prevention programmes: Key Program Science lessons from a Learning Site for sex workers in Mombasa, Kenya

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Background: Following a Program Science (PS) framework, Kenya's National AIDS and STI Control Programme implemented a Learning Site (LS) in Mombasa to support HIV prevention programming for female and male sex workers (FSW and MSW). Using PS meant that: epidemiological mapping informed prioritisation of geographic areas for service delivery; evidence-based, peer-led interventions were developed in partnership with key populations; service delivery was optimised through microplanning; programme monitoring and responsive strategic adaptations occurred throughout the programme's lifespan. We present findings from LS monitoring and highlight key PS lessons learned.

Methods: Monthly monitoring data was collected over 23-months. Individual-level indicators were analysed using SPSS, illustrating trends in enrolment and service utilisation.

Results: Epidemiological mapping identified "hotspots" where programme enrolment efforts were focused, leading to rapid achievement of outreach programme enrolment targets for FSW and MSW (80% of population estimates) by months 10 and 5, respectively. Through microplanning-informed outreach strategies, average condom distribution to FSW and MSW met targets (41 and 19 condoms/month, respectively) in all but 3 months. Among clinic-attendees, >60% were consistently screened for STIs and rates of diagnoses decreased (FSW: 25.1% to 3.7%; MSW: 24.0% to 5.9%). HIV testing rates decreased over the first five quarters (FSW: 54.0% to 34.5%; MSW: 65.0% to 16.8%), but increased in the final two quarters. Overall, HIV diagnoses among FSW decreased from 5.9% to 3.8%, and increased from 4.6% to 5.6% among MSW.

Discussion: Operationalisation of PS contributed to a number of LS successes, but also highlighted limitations and learning opportunities. Conventional monitoring data provide insight into programme activity and outputs, but do not elucidate why gaps in service delivery persist. Comprehensive programme monitoring should incorporate qualitative inquiry and rigorous protocols for process documentation to track programmatic decisions, record rationale for mid-course modifications, and facilitate more nuanced analyses of how programme implementation influences outputs.

Interdisciplinary Epidemiology (Biological, Behavioural and Social) or Biopsychosocial Research

Épidémiologie interdisciplinaire (biologique, comportementale et sociale) ou recherche biospychosociale

EPHP7.01

HIV and HIV Risk Behaviour Among Gay, Bisexual, and Other Men Who Have Sex with Men in Vancouver, Toronto, and Montreal: Preliminary Comparisons from the Engage Study

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Background: HIV in Canada is highly concentrated among gay, bisexual, and other men who have sex with men (GBMSM) living in large urban centres. Comparative data on HIV and risk behaviours in Vancouver, Toronto, and Montreal will improve understanding of the epidemic in this key population.

Methods: The Engage Study is a three-city cross-sectional study using respondent-driven sampling to recruit GBMSM (including trans men) ≥16 years who report sex with another man in the past 6 months (p6m). Participants completed computer-assisted self-interviews in English or French and nurse-administered STI/HIV testing. We describe crude distributions by city (V,T,M) with 95% confidence intervals for demographic and risk characteristics.

Results: From 02/2017-09/2017, we recruited 30% of our target sample: Vancouver n=107 (38 seeds), Toronto n=105 (27 seeds), and Montreal n=514 (27 seeds). HIV prevalence was similar across sites (20.0-24.5%). Preliminary results suggest participants in Toronto are less likely to identify

as gay (61.9% vs. 85.0%[V]/79.6%[M]). Participants in Montreal appear more likely to be unemployed (39.7% vs. 19.6%[V]/19.0%[T]), earn <$30,000/year (62.6% vs. 40.2%[V]/36.2%[T]), and less likely to identify as a person of colour (14.6% vs. 28.0%[V]/36.3%[T]). Participants in Vancouver reported more condomless anal sex p6m (CAS; 84.1% vs. 57.1%[T]/59.5%[M]) and compared with Montreal, more CAS (p6m) with an opposite/unknown serostatus partner (52.3% vs. 34.1%).

Table 1. Descriptive statistics of MSM in Vancouver, Toronto, and Montreal.

	Vancouver (n=107)		Toronto (n=105)		Montreal (n=514)	
	n (%)	95% CI	n (%)	95% CI	n (%)	95% CI
Age						
<30	51 (48)	38, 57	34 (32)	23, 42	152 (30)	26, 34
30-44	26 (24)	16, 33	60 (57)	48, 67	160 (31)	27, 35
≥45	30 (28)	19, 37	11 (11)	5, 16	202 (39)	35, 44
Person of Colour	30 (28)	19, 37	37 (36)	27, 46	72 (15)	12, 18
Annual Income						
<$30 000	43 (40)	31, 50	38 (36)	27, 46	322 (63)	59, 67
$30 000 - $59 999	36 (34)	25, 43	46 (44)	34, 53	143 (28)	24, 32
≥$60 000	28 (26)	18, 35	21 (20)	12, 28	49 (10)	7, 12
Employed	86 (80)	73, 88	85 (81)	73, 89	310 (60)	56, 65
Sexual Identity						
Gay	91 (85)	78, 92	65 (62)	52, 71	409 (80)	76, 83
Bisexual	6 (6)	1, 10	4 (4)	0, 8	43 (8)	6, 11
Other	10 (9)	4, 15	36 (34)	25, 44	62 (12)	9, 15
HIV Positive Serostatus	23 (21)	14, 29	21 (20)	12, 28	126 (25)	21, 28
Lifetime STI History	73 (68)	59, 77	65 (63)	53, 72	321 (63)	59, 68
# of male anal sex partners (P6M) (median, Q1,Q3)	4	2, 11	2	1, 10	2	1, 7
CAS (P6M)	90 (84)	77, 91	60 (57)	48, 67	306 (60)	55, 64
CAS with serodiscordant/unknown partner (P6M)	56 (52)	43, 62	40 (38)	29, 48	171 (34)	30, 38
Use of PrEP (ever)	13 (12)	6, 18	16 (15)	8, 22	52 (10)	8, 13
Non-Rx Drug Use	103 (96)	93, 100	98 (93)	88, 98	445 (88)	85, 91
Crystal Meth Use (P6M)	18 (17)	10, 24	10 (10)	4, 15	51 (10)	8, 13
(>P6M)	13 (12)	6, 18	19 (18)	11, 26	50 (10)	7, 13

Note: 95% CI = 95% confidence interval, CAS=condomless anal sex, P6M=past 6 months, Rx=prescription

Conclusions: Preliminary data from the Engage Study suggest similar prevalence of HIV but different demographics and risk behaviours across the three cities. Complete data will allow for a better understanding of the magnitude and importance of these differences.

EPHP7.02

Heterogeneity in HIV Prevalence Across Subsets of Adolescent Girls and Young Women in Kenya and Ukraine

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Introduction: In Kenya and Ukraine, HIV prevalence among adolescent girls and young women (AGYW) age 14-24 is 3.5% and 1.0% respectively. We examined the variability in HIV prevalence across subsets of AGYW.

Methods: We conducted a cross-sectional bio-behavioural survey among sexually active AGYW aged 14-24 years in Mombasa, Kenya and Dnipro, Ukraine in 2015. We used probabilistic sampling methods to recruit participants from hotspots where female sex workers congregate to solicit clients, and measured HIV prevalence using dried blood spot serology. We compared HIV prevalence by age, and by the following: AGWY who self-identified as sex workers (SW); engaged in transactional sex but not sex work (TS); or engaged in casual sex but not transactional sex or sex work (CS).

Results: Of 1299 and 1818 AGYW from Mombasa and Dnipro, respectively, 408 (31.4%) and 453 (24.9%) were SW. Overall HIV prevalence was 5.6% (95% CI:4.3-6.9%) in Mombasa and 4.9% (95% CI:3.9%-5.9%) in Dnipro. Among the youngest participants (14-18 years), HIV prevalence was 3.3% (95% CI: 1.7-4.9%) in Mombasa and 5.2% (95% CI:3.4-7.0%) in Dnipro. In Mombasa and Dnipro respectively, HIV prevalence among SW was 10.1% and 10.0%; followed by 3.6% and 3.0% among the TS subgroup, and 3.6% and 3.2% among the CS subgroup ($p<0.001$, $p<0.001$). HIV prevalence was 17.6% among the 85 AGYW who ever injected drugs in Dnipro, compared to 4.2% who never injected ($p<0.001$).

Conclusion: We identified a high prevalence of HIV, with heterogeneity across subgroups of AGYW. HIV prevalence was higher than the overall prevalence of HIV among AGWY in both regions, suggesting that our recruitment strategy reached a high-risk subpopulation. The high prevalence by age 18 suggests early acquisition of HIV within a high-risk context. Supportive policies and innovative programs, such as hotspot-based outreach, are required to facilitate provision of HIV prevention services to AGYW.

EPHP7.03

Frailty Phenotype in Canadian Men and Women with HIV

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Background: Human Immunodeficiency Virus(HIV) infection has changed over the past two decades from a disease with a dire prognosis to a manageable condition. There is now a population of people aging with HIV, and they wish to age well. One impediment to active aging is the emergence of frailty. HIV infection is thought to accelerate aging through chronic inflammation, immune system deterioration, depressive symptoms, and HIV-associated neurocognitive disorder and hence older people with HIV are at risk for becoming frail.

Objective: To estimate the prevalence of frailty in a cohort of Canadians of middle or older age with HIV and identify contributors to prevalence. The data came from the Positive Brain Health Now (BHN) cohort, an ongoing prospective study involving 872 persons living with HIV recruited between 2014 and 2016 from five clinics in Canada.

Methods: Fried's criteria (≥3 of 5) for frailty was operationalized using items from the SF-36 indicating slow gait speed, weak grip strength, and exhaustion, and low Body Mass Index (<21), and low physical activity.

Results: Table 1 summarizes the findings.

Table1. Summary of Findings

	Men (n=729)	Women (n=139)
Age in years; mean (SD)	53.3 (8.3)	50.5 (7.6)
≥3 of Fried's 5 criteria \	55 (7.5%)	17 (12.2%)
Physical Function Index (PFI) (0-100)		
<45/100	68 (9.3%)	22 (15.8%)
Mean (SD) [Norm]	82 (20.7) [89]	77 (23.0) [87]
Mental Health Index (MHI) (0-100)		
≤60	293 (40.2%)	59 (42.5%)
Odds Ratio for co-morbid arthritis for frailty	2.85 (1.46-5.58)	0.77 (0.16-3.66)

Discussion: The estimate of frailty in the BHN cohort was lower than estimates from similar HIV populations. However, these estimates are similar to general population estimates but for people at least 10 years older. A striking feature of the BHN cohort is that members were physically quite robust, at least on self-reported indicators. However, indicators of emotional and cognitive frailty were more prevalent, over 40%, and these receive rather less attention in the literature.

EPHP7.04

Intimate Partner Violence among People Living with HIV in Care in Ontario: Results from the Ontario HIV Treatment Network Cohort Study

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Background: Intimate partner violence (IPV) is correlated with poorer health outcomes and is recommended in regular clinical screening. In addition to being associated with HIV infection, IPV appears to impact cascade outcomes among people living with HIV.

Methods: The OHTN Cohort Study (OCS) is a longitudinal study following people living with HIV who receive care at HIV clinics in Ontario. We analyzed cross-sectional information on IPV, clinical and socio-demographic characteristics of OCS participants using questionnaires in 2016-2017. IPV includes physical, sexual, psychological, neglect, isolation, intimidation and economic abuse. Descriptive statistics and chi-square tests were used to describe the profile of participants who experience IPV and determine its relationship to self-reported HIV treatment and care outcomes.

Results: A total of 2,310 OCS participants (median age 52 (IQR 43-58)) completed questions regarding IPV. The majority of participants were ≥50 years of age (58.5%), male (80.3%), on antiretroviral treatment (ART) (96.3%), reported an undetectable viral load (UVL) (93.3%) and incomplete adherence (64.7%). Overall 28.9% reported ever experiencing IPV by a previous or current partner. IPV was more common among females compared to males (45.6% vs. 24.8%, p<0.0001). Heterosexual women reported higher rates than gay men (44.7% vs 27.1%, p<0.0001). Participants who experienced IPV were less likely to be on ART (28.6% vs. 37.65%, p=0.0699), adherent to treatment (22.6% vs 32.3%, p<0.0001), and have an UVL (28.2% vs. 41.4%, p=0.0008) compared to those who had not experienced IPV.

Conclusions: Participants reporting IPV were more likely to experience negative HIV-related health outcomes. The results of this analysis warrant the implementation of gender- and population-specific IPV screening in HIV clinics in order to support those experiencing IPV and address its associated negative health outcomes and risk-factors.

Additionally, clinics should implement both health care provider training and support services for people living with HIV who experience IPV.

EPHP7.05

Knowledge Attitudes regarding Treatment as Prevention (TasP) in a Canadian Multi-Site Study Among Men who have Sex with Men

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Background: Treatment as prevention (TasP) refers to testing and treating people who are living with HIV with antiretroviral therapy to reduce viral load in blood (and genital fluids) and reduce onward transmission of the virus. We examined knowledge, beliefs, and attitudes regarding TasP among gay, bisexual, and other men who have sex with men (gbMSBM) living in Toronto (T), Vancouver (V), and Montreal (M).

Methods: We recruited 732 gbMSM (30% of our target sample) in cross-sectional Engage study using respondent-driven sampling from 02/2017-09/2017. Participants were asked whether they had ever heard of TasP with follow up questions about sources of information, effectiveness of TasP and recent discussion about TasP with friends or sex partners. We used bivariate analyses examining frequency distributions of TasP knowledge, beliefs, and attitudes by city and key demographic characteristics.

Results: About half (51%) the sample reported knowledge of TasP (T-74%, V-80%, M-40%), among them 66% discussed TasP with friends or sex partners in the past 6 months (T-44%, V-69%, M-64%), and 88% considered TasP as moderately to completely effective (T-88%, V-87%, M-88%). One-third (33%) identified personal research as the source of their knowledge (T-42%, V-38%, M-27%). Other sources for TasP knowledge were gay/LGBT media (18%: T-14%, V-18%, M-20%), other media (15%:T-12%, V-11%, M-18%), community based organizations (9%:T-13%, V-10%, M-8%)), friends (7%:T-4%, V-10%, M-7%), sex partners (6%:T-1%, V-4%, M-9%), health professionals (5%:T-1%, V-3%, M-8%) and others (5%:T-13%, V-6%, M-3%).

Conclusions: Preliminary analysis from our study suggests that only half of gbMSM in the three largest cities in Canada knew about TasP, suggesting the need for greater awareness promotion efforts on TasP in gbMSM communities. Most believed that TasP was at least moderately effective. GbMSM report receiving their knowledge about TasP from a variety of non-traditional sources, suggesting benefits in disseminating knowledge through formal and social media.

EPHP7.06

Development of HIV and Hepatitis C Behavioural and Biological Surveillance Indicators Among Key Populations in Canada

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The Public Health Agency of Canada is renewing the Tracks Enhanced Surveillance Systems, which monitor trends in the prevalence of HIV and hepatitis C and other sexually transmitted blood-borne infections and in behaviours associated with the acquisition and transmission of these pathogens. Given recent changes in hepatitis C treatment, HIV biomedical prevention and endorsement of UNAIDS 90-90-90 targets, the Tracks indicators were updated to ensure the information generated from the Tracks is relevant, actionable and feasible.

A literature review and environmental scan of key indicators and risk factors was conducted. Screening criteria were applied to further refine the list to determine whether the indicators were: 1) relevant (i.e., met surveillance objectives and/or international reporting requirements on HIV/AIDS); 2) useful for public health action (i.e., informed prevention and treatment programs and policy); and 3) feasible (can be collected through an interviewer- or a self-administered survey method). Surveillance experts and other government and stakeholder partners were consulted to assess and refine the list of indicators using the same criteria.

73 indicators were identified and classified into four themes: socio-demographic factors and social determinants of health (n=17); risk behaviours: drug use (n=14), sexual (n=8); health care and prevention services: use (n=10), testing (n=6), treatment (n=8); and health outcomes (n=10). 34 previously used indicators were dropped; and 26 new indicators were added within the following domains: 8 to health care and prevention services use, 6 to social determinants of health, and 5 to HIV and hepatitis C treatment.

The use of the refined Tracks indicators is expected to positively impact the simplicity, acceptability and sustainability of the Tracks Surveillance System. It is expected that the introduction of these indicators will result in a leaner and more focused questionnaire with less burden on respondents; capturing only the data needed to meet the Tracks' surveillance objectives.

EPHP7.07

Relationship Between Self-reported Versus Clinic-abstracted Evidence of ART to Viral Load Undetectability in a Clinical Cohort of People Living with HIV

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Background: We compared self-reported and clinic-recorded evidence of antiretroviral treatment (ART) and the relationship of both to viral load (VL) detectability.

Methods: The Ontario Cohort Study (OCS) is a longitudinal study which collects questionnaire and clinical data from charts and electronic medical records (EMR). Participants were asked whether they were currently taking ART and evidence of ART prescriptions were abstracted from charts and EMRs. Both clinic-recorded evidence and questionnaire data were collected from participants from 2008-2015. These variables were compared to the last reported annual viral load result obtained from laboratory records. We used proportions to compare clinic-recorded and self-reported ART use. Undetectable VL is defined as VL<40 copies/mL.

Results: In total, 12,531 observations were included from 4,134 participants at eight clinical sites. As this is a cohort of individuals in care, there is high ART use with 95.9% of observations being linked to both clinic-recorded and self-reported ART use. There was a slight discordance between self-reported and clinic-recorded ART use, with 1.3% of those self-reporting ART having no clinic-recorded evidence of ART and 0.86% of those with clinic-recorded evidence of treatment having reported that they were not on ART. Annually, an average of 89.5% of participants with both self-reported and clinic-recorded evidence had undetectable VL. However for participants with only self-reported ART (no clinic-recorded evidence) (n=158), 57.5% had an undetectable VL, and for participants with only clinic-recorded evidence of ART use (self-reported no ART) (n=105), 15.3% had an undetectable VL.

Discussion: Our evidence suggests that self-report of ART use correlates strongly with clinic-recorded evidence. Self-report ART use is as good a predictor of an undetectable VL as clinic-recorded evidence in a cohort of people living with HIV who are in care. These results have implications to inform surveillance and research to support care of people living with HIV.

EPHP7.08

Undetectable or Unknown? Longitudinal Sexual Event-Level Analysis Among Gay, Bisexual and Other Men Who Have Sex With Men (GBM) in Metro Vancouver

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Background: HPTN 052 and PARTNER study findings catalyzed community activism on "undetectable=untransmittable" (U=U). We examined temporal trends and factors associated with undetectable HIV status sexual partners among GBM.

Methods: Prospective cohort data were collected from 09/2014-02/2017 from sexually-active Metro Vancouver GBM recruited using respondent-driven sampling (RDS). Participants completed study visits every six months, providing event-level data on their last sexual encounter with their five most recent partners. Stratified by HIV status, we used four-level mixed effects models (RDS recruitment chain; participant; visit; event) to evaluate temporal trends (6-month periods) and factors associated with partner's HIV status. We built multivariable models to compare events where partners were reported as "undetectable" versus unknown HIV status using backward selection with AIC minimization.

Results: 481 participants completed 1303 visits reporting on 3786 sexual events (29.7% from self-reported HIV-positive GBM). There were no temporal trends in reporting an undetectable partner for HIV-negative GBM (mean=5.0%, p=0.14) or HIV-positive GBM (mean=14.5%, p=0.71). Multivariable models of factors associated with undetectable versus unknown HIV status partners are below. Regardless of participant's HIV status, their undetectable partners were older and from longer sexual relationships. Condomless anal sex (insertive and receptive) was more likely with undetectable partners. HIV treatment optimism was not associated for HIV-positive GBM (p=0.35) nor selected in multivariable models among HIV-negative GBM (OR=1.12, 95%CI:1.06-1.19).

Conclusions: Although the frequency of undetectable partners has not increased over time, these partners were older, with longer sexual relationships, and used condoms less. These sexual practices reflect community knowledge of U=U scientific consensus.

	HIV-positive men AOR (95%CI)	HIV-negative men AOR (95%CI)
Participant was Asian (vs. White)	Not selected	0.09 (0.02-0.52)
Participant was sex worker (vs. not)	0.04 (0.01-0.29)	0.05 (0.01-0.29)
Participant used viral load sorting (vs. not)	Not significant	6.42 (3.36-12.27)
Partner was older (vs. younger)	2.42 (1.05-5.58)	2.97 (1.42-6.21)
Had condomless receptive anal sex (vs. not)	2.37 (1.04-5.39)	3.25 (1.86-5.70)
Had condomless insertive anal sex (vs. not)	5.81 (2.94-11.48)	6.12 (3.49-10.74)
Shared sex toys (vs. not)	6.79 (1.18-38.97)	9.94 (2.64-37.50)
Sexual relationship length (per month)	1.01 (1.00-1.01)	1.01 (1.00-1.03)
Number of sexual acts (per act)	1.13 (1.05-1.20)	Not selected

EPHP7.09

Methadone Treatment, Severe Food Insecurity, and HIV-HCV Co-Infection: a Propensity Score Matching Analysis

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Background: Severe food insecurity (FI), which indicates reduced food intake and the physical sensation of hunger, is common among individuals living with HIV-hepatitis C virus (HCV) co-infection. We hypothesize that the injection of opioids is partly responsible for the association between injection drug use and severe FI. This analysis examines whether methadone treatment for opioid dependence is associated with a lower risk of severe FI among HIV-HCV co-infected individuals in Canada.

Methods: We used biannual data from the Food Security & HIV-HCV Study (CTN 264) of the Canadian Co-infection Cohort (N = 608, November 2012-October 2015). Methadone treatment (no vs. yes: exposure) was self-reported and severe FI (no vs. yes: outcome) was measured using the 10-item adult scale of Health Canada's Household Food Security Survey Module ($\geq$ 6 affirmative responses). After variable lagging and adjustment for socioeconomic, sociodemographic, behavioural, and clinical confounders through propensity score matching, we estimated a marginal risk difference (RD) that quantified the association between methadone treatment and severe FI.

Results: Among participants, 25% experienced severe FI in the six months preceding the first time-point in the analytical sample and 5% concurrently reported receiving methadone treatment. Injection of opioids in the six months preceding the treatment and outcome measurements was more prevalent among those who received methadone treatment (39% vs. 12%). Among the treated participants, 97% had injected opioids in their lifetimes. After propensity score matching, the average risk of experiencing severe FI was 12.3 percentage-points lower among individuals receiving methadone treatment, compared to those who were not receiving treatment (marginal RD = -0.123, 95% CI = -0.230, -0.015).

Conclusions: After variable lagging and adjustment for confounding, methadone treatment was associated with a lower risk of severe FI. These findings suggest that methadone treatment may mitigate severe FI in this vulnerable subset of the HIV-positive population.

EPHP7.10

Quantifying Sexual Mixing Patterns Among Gay, Bisexual, and Other Men Who Have Sex with Men in Canada: Implications for Modeling HIV/STI Transmission

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Background: In mathematical models of HIV/STI transmission, sexual mixing patterns refer to "who has sex with whom," where individuals and their sex partners are described by attributes such as perceived HIV serostatus. Most HIV/STI transmission models assume random mixing (i.e. no serosorting). We quantified sexual mixing in a sample of gay, bisexual, and other men who have sex with men (gbMSM) in Canada.

Methods: We used preliminary Engage study data (N=726, Feb-Sept, 2017. Details in Table 1) to estimate the number of anal sex partners in the previous 6 months (P6M) by partner attributes (perceived and disclosed HIV status), stratified by the respondents' HIV status (positive, uninfected [tested negative P6M], and unknown). We used a chi-squared test to compare observed partnerships by perceived HIV serostatus to expected partnerships under random mixing.

Results: N=158 (22%) were HIV-positive, N=294 (40%) were uninfected and N=274 (38%) were of unknown status, reporting a median of 4 (IQR, 2-15), 5 (2-11.5), and 2 (1-4) anal sex partners respectively, in the P6M. Mixing was not random and highly seroconcordant as reported

by each group (i.e. respondents more likely select partners with similar HIV serostatus) (Table 1).

Table 1. Proportions (95% confidence intervals) of sexual partnerships by perceived HIV serostatus as expected with random mixing versus observed patterns in the Engage study* (n=726)

			Partner's HIV status				
			HIV-positive	Uninfected	HIV status unknown	Total	p-value for χ^2
		Expected** (if random mixing)	0.28 (0.27, 0.29)	0.52 (0.51, 0.53)	0.20 (0.19, 0.21)	1	
Respondent's HIV status	HIV-positive	Observed	0.49 (0.47, 0.51)	0.19 (0.17, 0.21)	0.32 (0.30, 0.34)	1	p<0.0001
	Uninfected	Observed	0.09 (0.08, 0.10)	0.47 (0.45, 0.48)	0.44 (0.43, 0.46)	1	p<0.0001
	HIV status unknown	Observed	0.06 (0.05, 0.08)	0.42 (0.39, 0.45)	0.52 (0.49, 0.54)	1	p<0.0001

* Three-city (Montreal, Vancouver, Toronto) cross-sectional study using respondent-driven sampling to recruit cisgender and transgender men ≥16 years who had sex with another man in the past 6 months (P6M)

** Expected proportions calculated based on distribution of partnerships by perceived HIV serostatus at the population-level overall. Observed proportions are based on the reported number of partners by HIV serostatus of partner and by HIV serostatus of respondent (i.e when reported by HIV-positive, uninfected or HIV status unknown participants)

p-value >0.10 suggests random (proportionate) mixing pattern by HIV-serostatus

Conclusion: Preliminary data suggest a high degree of serosorting by and across perceived HIV serostatus. Sexual mixing by serostatus can be empirically estimated and used in mathematical models to better reproduce the underlying HIV/STI transmission dynamics. Future work includes analysing the final dataset; examining disclosure, partnership type and number of sex acts; and alternative survey questions to estimate sexual mixing.

EPHP7.11

Levels of Activation for Self-Management among People Living with HIV

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Background: People living with HIV and being treated with continuous antiretroviral therapy are aging with episodic chronic conditions and may benefit from chronic disease self-management approaches used in conditions like diabetes. We assessed the self-management activation of people living with HIV in comparison to those of people living with diabetes mellitus.

Methods: We conducted a cross-sectional survey study with people living with HIV and people living with diabetes mellitus. We used the PAM® to assess respondents' self-management ability. This quantitative assessment tool asks about respondents' knowledge, skills, confidence, and engaging in, and maintaining health behaviours. Descriptive statistics were used to compare the demographics of the cohorts. Univariate and multivariable regression models, adjusted for patient characteristics, were used to assess associations between patient demographics and PAM® scores.

Results: Respondents in the HIV and diabetes cohorts had a similar mean age of 50.5 and 52.5 years. The cohorts differed based on their gender and ethnic background, with a higher proportion of people who identified as men and African/Caribbean/Black in the HIV cohort. People living with HIV had high levels of activation that were no different from those of people with diabetes (mean score 67.2, standard deviation 14.2 versus 65.0, standard deviation 14.9, p=0.18). A similar proportion of people from both cohorts were considered fully activated (34.6% people with HIV versus 28.2% people with diabetes). After adjusting for patient characteristics, only receiving disability support compared to being employed was associated with being less activated (adjusted odds ratio 0.02, 95% confidence interval 0.10-0.74, p=0.01).

Conclusion: People living with HIV have high levels of activation that are comparable to patients with diabetes mellitus. Our study sheds new light on the potential for the implementation of already existing standardized chronic disease self-management programs to enhance the care delivery and improve outcomes among people living with HIV.

Methodological Advances in Epidemiology, Public Health and Mathematical Modelling

Progrès méthodologiques en épidémiologie, santé publique et modélisation mathématique

EPHP8.01

How Will Art Progress Affect the Impact of Future HIV Vaccination in South Africa?

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Multi-dose HIV vaccines are being tested in the HVTN 702 and 705 trials in southern Africa. Previous modeling results suggest that vaccine impact may be highly sensitive to

future epidemic conditions. Our goal is to investigate the effect of ART progress on future HIV vaccination.

We modified an HIV transmission model calibrated to 2012 epidemiological data from South Africa assuming universal access to ART in 2017 and vaccination campaigns starting in 2027. We modeled a 6-dose vaccine regimen averaging 50% efficacy over 36 months and investigated two revaccination boosters averaging 32% and 44% over 18 months. We projected HIV incidence, vaccine effectiveness (cumulative fraction of infections prevented) and efficiency (number of HIV infections prevented per 1,000 vaccinations) under two scenarios of ART progress: (1) maintaining 2017 treatment cascade (base-case scenario, BCS), and (2) ART scale-up after 2017 (optimistic scenario, OS).

Under OS, 60% of simulations reached all 90-90-90 targets before 2027 (0% under BCS). In 2026, HIV incidence is 2.9-4.3 times higher in BCS than in OS, with greater relative decline over 20 years in OS. Similar vaccine effectiveness is projected under BCS and OS, while vaccine efficiency is 4.0-7.4 times higher under BCS. Using a high efficacy booster improves vaccine effectiveness and efficiency by 17-20% compared to a lower efficacy booster.

Our results suggest that the efficiency of HIV vaccination will strongly depend on ART program success in South Africa before vaccine introduction. Cost-effectiveness analyses will be needed to determine how to optimally utilize resources allocated for HIV prevention.

Model results (range over 1000 simulations)	Base-case scenario	Optimistic scenario
HIV incidence during 2026 (yearly new HIV infections per 1000 HIV negative adults)	5.25-16.27	1.22-5.69
Simulations reaching		
(a) 90% diagnosed	(a) 0%	(a) 98.2%
(b) 90% treated	(b) 52.0%	(b) 98.8%
(c) 90% virally suppressed	(c) 2.3%	(c) 61.0%
(d) all targets, in 2026	(d) 0%	(d) 60.3%
HIV incidence during 2046 (yearly new HIV infections per 1000 HIV negative adults)	NV: 2.14-14.54 LB: 1.70-12.01 HB: 1.61-11.47	NV: 0.22-2.85 LB: 0.19-2.41 HB: 0.18-2.32
Cumulative fraction of infections prevented by vaccination over 20 years	LB: 11.40-15.26% HB: 13.64-17.92%	LB: 10.63-13.36% HB: 12.60-15.69%
Number of HIV infections prevented per 1000 vaccinations over 20 years	LB: 3.92-15.59 HB: 4.60-18.59	LB: 0.53-3.90 HB: 0.62-4.64

NV: no vaccination, LB: vaccination with low efficacy booster,

HB: vaccination with high efficacy booster

90-90-90 targets: >90% HIV+ individuals are diagnosed, >90% HIV+ diagnosed are on treatment, >90% HIV+ on treatment are virally suppressed

Vaccination campaigns are scheduled every 36 months to maintain 20% coverage in adult population (15-49 years old), and booster revaccinations are planned every 18 months. It is assumed that vaccinated cohorts suffer 20% attrition between revaccinations.

EPHP8.02

Safety and Efficacy of Antiretroviral Drugs and Implementation Strategies for HIV Pre-exposure Prophylaxis: A Systematic Review and Network Meta-analysis

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Introduction: Pre-exposure prophylaxis (PrEP) represents a promising opportunity for HIV prevention; however, there remains debate among clinicians and policymakers how best to deploy PrEP. Existing systematic reviews on the efficacy of PrEP do not provide end-users with a comparison of implementation or delivery strategies for PrEP.

Objective: To compare the relative effects of different antiretroviral (ARV) regimens and PrEP implementation strategies on HIV acquisition and adherence rates in men who have sex with men (MSM), people who inject drugs (PWID), serodiscordant couples, sexually active young adults, sex workers, and transgender individual.

Methods: We searched for relevant studies using electronic databases and included experimental or cohort studies that administered PrEP to individuals at high risk of HIV transmission. Study screening, data extraction and risk of bias assessment were performed independently by two reviewers. We will perform Bayesian network meta-analysis (NMA) to compare the outcomes of interest for various ARVs and implementation strategies.

Results: Of 4,502 de-duplicated studies identified, 1,184 underwent full-text screening, and 77 were included. 31 were randomized controlled trials, representing 15 unique trials. Studies were conducted between 2007 and 2017, mostly in sub-Saharan Africa, Thailand and the USA, (n=50-4758). Overall, 17 studies reported HIV incidence data, and 14 reported adherence. Among the unique trials, most (n=11) focused on MSM while the rest included serodiscordant couples, PWID and transwomen. The most widely administered ARV regimen was TDF/FTC (n=9). Among studies focusing on TDF/FTC, the authors compared intermittent vs. daily (n=2), immediate vs. deferred (n=2), TDF/FTC vs. placebo only (n=3), or other regimens (n=2). Common implementation strategies included sexual health education and HIV risk reduction counseling. The results of the pairwise analyses and NMAs will be presented.

Conclusion: Findings from this study will provide a new evidence base for the relative impact of implementation strategies on PrEP adherence and HIV acquisition.

EPHP8.03

Incorporating Sexual Health Survey and Clinical Data to Predict the Impact of Testing Among Gay, Bisexual and Other Men Who Have Sex with Men in Vancouver, Canada

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In response to the HIV epidemic and to provide greater access, the idea of internet-based testing lead to the development of the GetCheckedOnline (GCO) program by the British Columbia Centre for Disease Control. It is, however, not clear currently what long-term impact there may be on incidence in using such a system that can increase testing. We explore this question using a model of HIV dynamics within the Gay, Bisexual and other Men who have Sex with Men (GBMSM) community, explicitly accounting for individuals' risk to acquiring infection; their testing patterns and knowledge of infection status. The model also incorporates transitions between risk and testing groups to account for where certain risk behaviors are transient.

We introduce a novel Bayesian analysis that is able to incorporate potentially unreliable sexual health survey data along with firm clinical diagnosis data. We parameterize the model using survey and diagnostic data drawn from a population of men in Vancouver, Canada.

We predict that increasing testing frequency will yield a small-scale but long-term impact on the epidemic in terms of new infections averted, as well as a large short-term impact on numbers of detected cases. These effects are predicted to occur even when a testing intervention is short-lived. We show that a short-lived but intensive testing campaign can potentially produce many of the same benefits as a campaign that is less intensive but of longer duration. We demonstrate how these results fit within the context of GCO.

EPHP8.04

The Compounding Impact of Comorbidities on Mortality among People Living with HIV: A Marginal Structural Model Analysis in the COAST Study

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Background: Premature mortality from non-AIDS related causes are on the rise, mainly as a result of the accelerated aging of people living with HIV (PLWH). In this study, we examined the impact of comorbidities on all-cause mortality among PLWH in British Columbia, Canada.

Methods: This retrospective study was based on data from the Comparative Outcomes and Service Utilization Trends (COAST) study. Eligible individuals were antiretroviral therapy (ART)-naïve, were ≥19 years old, and initiated ART between January 2000 and March 2013. Comorbidities were identified from a validated case-finding algorithm used for the Charlson Comorbidity Index. Marginal structural modeling was used to estimate the longitudinal effect of the presence of comorbidities on mortality and to address the potential confounding between time-dependent variables. We also performed a dose-response analysis to assess the impact of having 1, 2, and ≥3 comorbidities versus none on mortality risk. All models were adjusted for demographic and treatment-related factors.

Results: Of the 5195 PLWH included in the analysis, 72% had ≥1 comorbidity at the end of the follow-up period. The age-sex standardized mortality rates were 8.13/1000 person-years (PY) (95% Confidence Interval (CI): 3.92-18.11) for individuals without comorbidities and 38.59/1000PY (95% CI: 33.88-44.10) for individuals with ≥1 comorbidity(ies). Marginal structural modeling showed that participants with ≥1 comorbidity(ies) were 5.08 times (95% CI: 3.61-7.14) more likely to die than those without. The dose-response analysis showed that individuals with ≥3 comorbidities were 4.11 (95% CI: 3-5.62), those with 2 comorbidities were 2.96 (95% CI: 2.12-4.11), and those with 1 comorbidity were 2.27 (95% CI: 1.63-3.17) times more likely to die than individuals without comorbidities.

Conclusion: There is a strong positive dose-response association between the number of comorbidities and mortality risk among PLWH. Further analyses are underway to investigate which comorbidities have the highest impact on the risk of mortality.

EPHP8.05

Promoting Diversity in Selecting Patients for HIV Trials: the Determinantal Point Process as a Statistical Sampling Method

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Background: Clinical trials have consistently played an important role in evidence-based medicine and drug development. Randomized Clinical Trials (RCTs) represent

the best evidence for such advances and have been used as the traditional way of conducting clinical trials in HIV infection. They are directed by a single research question aimed at evaluating the efficacy of a single treatment and following rigid protocols. Because of strict sampling, these trials are conducted with homogeneous patients and generate results that reproduce ideal conditions, favouring internal validity rather than external validity. RCTs give rise to inherent challenges in using results in the real-world clinical practice context. Classical sampling methods for RCTs tend to exclude subsets of patients (e.g., those with comorbidities), creating a considerable gap between the target population (the population to which researchers are interested in generalizing conclusions) and the study population (the population from which researchers derive their conclusions).

Methods: Consequently, we investigated other methods for sampling in HIV trials, as statistics and mathematics can offer innovative approaches. The determinantal point process (DPP) is a mathematical model used in physics to conceptualize repulsion between fermions. Recently, it has been proposed as a sampling method in selection problems where diversity is preferred.

Results: We developed a DPP model for application in HIV research for selecting samples of patients that consider not only representativeness, but also diversity on selected traits, creating heterogeneous groups that can better represent real conditions and the range of HIV-infected patients. This method will be detailed in the presentation.

Conclusions: The DPP is a promising sampling method that can be applied to clinical HIV research, promoting diversity when selecting HIV-infected patients for trials.

EPHP8.06

Comparing Estimates for HIV Prevalence, Incident Cases and Percent of People Living with HIV (PLWH) Undiagnosed Utilizing Three Estimation Methods

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Background: In 2015, UN endorsed the 90-90-90 Target to bring upon the END of AIDS as a public health threat. However, estimating HIV prevalence is methodologically challenging. Therefore, it is essential to have a robust methodology to not only estimate the HIV prevalence, but also incident cases and percent of PLWH undiagnosed in order to properly monitor the progress toward the UN 90-90-90 Target.

Methods: We simulated a HIV epidemic using a published compartmental transmission model, and estimated three epidemic indicators utilizing the methodologies proposed by the US Centers for Disease Control and Prevention (US Method), the European Centre for Disease Prevention and Control (Netherlands Method) and by the Public Health Agency of Canada (Ottawa/Sydney Method). We tested the robustness of each method by varying key parameters.

Results: Table 1 shows the indicators for the real simulated data and % error of the estimates from each method. For HIV prevalence and incident cases, we observed large variability among methods in 1985, and a smaller variability in 1996 and 2014. For percent of undiagnosed PLWH, only the Ottawa/Sydney Method showed decreasing % error from 1996 to 2014.

Table 1: % error of simulated HIV prevalence, incident cases and percent of undiagnosed PLWH in 1985, 1996 and 2014 by each method in comparison to real simulated data.

	Calendar Year	Real Simulated Data	% Error		
			Netherlands Method	US Method	Ottawa/ Sydney Method
HIV Incident Cases	1985	414	40%	27%	46%
	1996	265	1%	8%	33%
	2014	339	27%	26%	15%
HIV Prevalence	1985	4359	12%	58%	31%
	1996	3877	2%	13%	3%
	2014	5471	13%	8%	5%
Percent of Undiagnosed PLWH	1985	94%	5%	4%	7%
	1996	21%	23%	1%	29%
	2014	14%	49%	14%	10%

Conclusions: Our results demonstrate that the estimates of HIV prevalence, incidence, and percent of undiagnosed PLWH derived from the three different methods broadly agreed with the real simulated data. However, the % error was not trivial at 5-13% for HIV prevalence, 15-27% for incidence, and 10-49% for percent of undiagnosed PLWH in 2014, therefore these estimates should be used with great deal of caution

EPHP8.07

The Need for Targeting People Who Inject Drugs and Baby Boomer Populations Independently in the Fight against the HCV Epidemic in British Columbia, Canada

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Background: In North America, people who were born between 1945 and 1964 (so-called baby boomers [BB]) and people who inject drugs (PWID) contribute to the majority of prevalent and new HCV infections, respectively. Given the rollout of direct-acting antiviral agents with no restriction on fibrosis stage in British Columbia in 2018/2019, we

explored the impact of reducing time between undiagnosed infection and treatment initiation on the epidemiology of HCV among PWID and BB populations.

Methods: We utilized a compartmental model to simulate HCV transmission and disease progression in PWID and BB populations. Model projections up to 2040 were used to estimate the impact of reducing time between infection and diagnosis (TEST), between diagnosis and linkage to care (LINK), and between linkage to care and treatment initiation (TREAT) on HCV prevalence, HCV incidence, and HCV-related mortality rate.

Results: Estimates for each scenario are shown in Table 1. The TEST&LINK&TREAT scenario achieved HCV elimination and reduced the HCV-related mortality rate by 99% for PWID and 97% for BB. For PWID, the LINK&TREAT scenario achieved comparable results in comparison to the TEST&LINK&TREAT scenario by reducing HCV incidence and prevalence by 94%, and the HCV-related mortality rate by 95%. For BB, the TEST&LINK scenario reduced prevalence by 99% and the HCV-related mortality rate by 91%.

Table 1: Percent decrease in outcomes in comparison to the Status Quo (i.e., baseline), in 2040, under different intervention scenarios: TEST - increase monthly testing rate from 11.7/3.3 to 41.6/41.6 per 1000 PWID/BB per month; LINK - increase monthly rate of linkage to care (defined by completion of HCV RNA genotyping due to lack of data) from 3.1/7.8 to 166.7/1000 per 1000 PWID/BB per month; TREAT - increase monthly rate of treatment initiation from 4.5/26.7 to 1000/1000 per 1000 PWID/BB per month.

		Incidence*		Prevalence		HCV-related Mortaliy Rate	
		PWID	BB	PWID	BB	PWID	BB
Status Quo		6.7 per 1000 PWID per month	-	26448	4159	0.5 per 1000 PWID per month	0.7 per 1000 BB per month
Percent Decrease from the Status Quo	TEST	2%	-	2%	57%	1%	43%
	LINK	22%	-	24%	39%	25%	38%
	TREAT	25%	-	27%	13%	40%	15%
	TEST&LINK	29%	-	32%	99%	29%	91%
	LINK&TREAT	94%	-	94%	48%	95%	50%
	TEST&LINK &TREAT	100%	-	100%	100%	99%	97%

* - We assumed that new infections only occurred among PWID

Conclusions: Targeted interventions achieved comparable benefits to the optimal scenario for the PWID and BB populations. Emphasis should be placed on treatment uptake for PWID and testing for BB, in combination to improvements on engagement of HCV health care

Policy Evaluations

Évaluations des politiques

EPHP9.01

Policy-based Interventions to Reach UNAIDS 90-90-90

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Background: Reaching the UNAIDS 90-90-90 targets to end the HIV/AIDS epidemic by 2020, (which translate to 90-81-73 by proportions), relies on proven interventions that engage, screen and link untested HIV+ individuals to care. Effective policies at the national level have the potential to generate a greater impact. This systematic review evaluated policy changes that were successful in order to direct future interventions.

Methods: We searched 11 databases between 2007-2017 and classified eligible studies by country income level (low [LIC], medium [MIC], high [HIC]), UNAIDS targets, type of intervention, and outcomes. Studies were successful if they reached the target proportions and unsuccessful otherwise.

Results: Eight studies met our eligibility criteria, results are summarized in Table 1.

Table 1: Results

Country	Income Level	UNAIDS 90-90-90 Targets	Intervention	Met Target or Did not meet target
USA	HIC	First 90	Expansive partner services policy	Met
USA	HIC	Second 90	Expanded HIV treatment policy	Met
CANADA	HIC	First 90	Expanded partner notification	Met
SOUTH AFRICA	MIC	Second 90	Same-day diagnosis CD4 count guidelines	Met
RWANDA	LIC	First 90	Community-based health insurance policy and performance based financing	Met
MALAWI	LIC	First 90; Second 90	MSF-related program	Met Met
RWANDA	LIC	Second 90	ART initiation policy	Met
RWANDA	LIC	Second 90; Third 90	National HIV program	Did not meet; Met

Conclusion: In LIC/MIC, policies are not adhered to, thus impeding the country's potential to meet UNAIDS targets, whereas in HIC, policies are enforced and followed, allowing targets to be met. Studies that are well docu-

mented, have proper infrastructure and are more involved and innovative at each step of the cascade of care, meet the targets. Across income levels, it is evident that a multi-pronged approach that connects programs and stakeholders via expanded testing, linkages to care, and retention in care are necessary to keep patients in care. Policies that enforce same-day diagnosis help improve these linkages to care.

EPHP9.02

Human Papillomavirus (HPV) Vaccine Uptake in Gay, Bisexual, and Other Men Who Have Sex with Men (gbMSM) in Montreal, Toronto, and Vancouver

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Background: gbMSM are at increased risk for HPV-associated cancer, particularly if HIV coinfected. Vaccination protects against the HPV types responsible for most anal and oral cancers. In 2016, British Columbia, Ontario, and Quebec implemented HPV vaccine policies for gbMSM aged ≤26. We explored vaccine awareness, healthcare utilization factors, disclosure patterns and willingness to be vaccinated to assess potential vaccine uptake.

Methods: Engage is an ongoing cross-sectional health survey among gbMSM aged 16+ in Montreal, Toronto, and Vancouver. Men are recruited using respondent driven sampling. Using preliminary data and the Fisher's exact test, we compared crude proportions by age for responses to HPV-related questions on vaccine receipt, healthcare use, sexual orientation disclosure and willingness to be vaccinated.

Results: As of 30/09/2017, 724 men enrolled (median age 38.7 years, IQR 28-50, 20% ≤26) of whom 22% self-reported being HIV+. Among all, most were from Montreal (71%) and identified as gay (78%). In Montreal, Toronto, and Vancouver, 67.0%, 82.9% and 86.9% were aware of the HPV vaccine, respectively. A higher proportion of older (>26) men had a regular provider, disclosed having sex with men and felt comfortable discussing gbMSM health issues with their provider, and were willing to get vaccinated (Table 1). The majority were unvaccinated (Table 1).

Table 1: Healthcare utilization, disclosure patterns, and HPV vaccine acceptance, by age group.

	Aged ≤26	Aged >26	P Value
Has regular health care providera	81/144 (56.2%)	441/580 (76.0%)	<0.0001
Disclosed having sex with men to provider	54/81 (66.7%)	381/441 (86.4%)	0.0007
Comfortable talking about gbMSM health issues with providera	59/81 (72.8%)	372/441 (84.4%)	0.0202
(Among unvaccinated/DK if vaccinated men) Likely/very likely to get vaccinated if free of charge and had to disclose same-sex activity to providerb	37/59 (62.7%)	270/348 (77.6%)	0.0117
Had 1+ dose of HPV vaccinea			
Montreal	36/97 (37.11%)	13/415 (3.1%)	<0.0001
Toronto	4/15 (26.7%)	23/90 (25.6%)	0.7199
Vancouver	19/32 (59.4%)	21/75 (28.0%)	0.0092

a) Comparing response options yes vs. no.

b) DK = don't know. Comparing response options very likely/likely vs. very unlikely/unlikely/undecided.

Conclusion: Most gbMSM remain unvaccinated. Among younger gbMSM eligible for free vaccination, not having a regular provider and not disclosing sex with men may be potential barriers to vaccine uptake. There is opportunity to increase uptake through vaccine promotion and access to vaccination services.

EPHP9.03

Impact of Federal Healthcare Policy Changes on Access to Antiretroviral Therapy in Asylum Seekers Living with HIV/AIDS

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According to the Canadian Immigration Council, the Interim Federal Health Program (IFHP) provides temporary healthcare protection for people who are not eligible for either private or provincial healthcare insurance plans. Two separate political events lead to potential drug interruptions in beneficiaries of the IFHP in Quebec.

Objective: To investigate the impact of changes in federal policies on access to antiretroviral treatment.

Methods: We conducted a retrospective longitudinal study including HIV-infected asylum seekers followed at the Chronic Viral Illness Service of the McGill University Health Centre from January 2010-June 2014. Expected dates of potential drug interruptions were December 2010-February 2011 and June 2012-August 2012.

Results: At the time of first drug interruption, 155 patients were included: median age 39 years (IQR 33-46), median time since antiretroviral initiation 2 years (IQR 1-4). Thirty-seven (24%) patients required at least one intervention: 17 required pharmaceutical company compassionate access and 24 required referral to another retail pharmacy. Seven patients (5%) missed a median of 6 days of medication (IQR 5-21; range 3-902). At the time of 2nd drug interruption, 176 patients were included: median age 40 (IQR 34-47), median time since antiretroviral initiation 3 years (IQR 1-5). Fourteen (8%) patients required at least one intervention: 2 required coordination with RAMQ, 4 with IFHP, 3 with private insurance, 2 with pharmaceutical companies for compassionate access and 3 patients required referral to community organizations. Four (2%) patients missed 7,7,23 and 186 days of medication respectively (median 15 days).

Conclusion: Changes in federal policies can require complex coordination with several entities to ensure access to antiretroviral therapy. Thanks to an interdisciplinary team specialized in the care of patients living with HIV/AIDS, changes in healthcare protection resulted in antiretroviral drug therapy interruptions only in a small number of patients. Further research on biological impact is expected.

Process Advances and Lessons Learned in Complex or Community-based Public Health Research

Progrès des processus et leçons tirées dans les recherches complexes ou communautaires en santé physique

EPHP10.01

Epidemiology of HIV Outbreak in Southeastern Saskatchewan First Nations Communities

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Background: An HIV outbreak was declared in a rural town and surrounding First Nations communities in Southeastern Saskatchewan after a cluster of six cases were diagnosed in April and May 2016.

Objectives: The objective of this study is to describe the socio-demographics and behavioral characteristics of the clients associated with this HIV outbreak in Southeastern Saskatchewan.

Methods: Descriptive statistics was used to analyze the demographics information of the clients. Fisher's Exact test was conducted to measure any associations between variables using Stata IC 14.2.

Results: Between April 2016 and November 2017, the outbreak identified 21 HIV cases with majority cases (71%) reporting injection drug use (IDU) as their primary risk factor. Majority of the cases (86%) resided in First Nations communities at the time of their HIV diagnosis. In addition, 86% of the HIV cases were co-infected with Hepatitis-C (HCV). The median age of the HIV cases was 34 years old and the majority were male (62%). Over half of the cases (52%) were estimated to be a recent HIV infection. Thirty two contacts were identified of which 81% were HCV positive. Among the cases and contacts, IDU behavior was associated with HCV infection (p-value < 0.001).

Conclusions: Self-reported IDU was identified as the primary risk factor for the HIV outbreak and was also associated with history of HCV infections among the cases and contacts. Consequently, harm reduction programs would be the key areas of focus for prevention and to limit the spread of HIV and HCV. This study describing the characteristics of the HIV outbreak population will inform future related outbreaks in other indigenous communities in Canada. This study will inform further research in the areas of indigenous health, HIV prevention, harm reduction and injection drug use to improve the health and wellbeing of indigenous Canadians**.**

EPHP10.02

Applying the Chronic Care Model to Improve the Health of People Living with HIV: The Role of Self-Management Support

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People living with HIV (PLWH) are living longer with the health-related disability associated with HIV, long-term antiretroviral therapy medication, and age-related multimorbidity. However, health services in Canada have failed to keep up with the evolving care needs of this complex population. In response, our research team will address one key component of the evidence-based Chronic Care Model: Self-Management Support. We will conduct the first large-scale trial of the widely-adopted Stanford Chronic Disease Self-Management Program (CDSMP) – as well as the less-adopted HIV-specific version, the Positive Self-Management Program (PSMP) – among PLWH. This peer-led program has been proven effective across chronic conditions with respect to increasing the knowledge, skills, confidence and motivation needed for patients to navigate

the impacts of living with chronic conditions. It is endorsed by Canadian policymakers and already delivered in our partner provinces (Nova Scotia, Ontario, Manitoba, British Columbia) but to date without coordinated implementation among PLWH. To launch this work, our team hosted an international meeting to discuss self-management interventions for PLWH, and formed an interdisciplinary, national team that submitted a CIHR Team Grant. This program of research will include several phases: 1) a scoping literature review on the conceptualization of self-management and self-management support among PLWH; and 2) qualitative interviews with diverse stakeholders, including PLWH, community-based agencies, and care providers about gaps identified in the scoping review and considerations for intervention delivery. Results from the review and interviews will inform 3) the implementation and evaluation of the CDSMP or PSMP using the RE-AIM framework (Reach-Effectiveness-Adoption-Implementation-Maintenance). We will incorporate anti-oppressive principles to consider HIV priority populations, engage people with lived experience of marginalization, and attend to sex- and gender-based issues throughout this work. By leveraging existing community partnerships and networks, this research will build capacity, enhance health care delivery, and improve health among PLWH in Canada.

EPHP10.03

Innovations and Challenges in Housing Provision for People Living with HIV: A Policy and Service Perspective

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Background: *Positive Living, Positive Homes* (PLPH) is a community-based research (CBR) study examining HIV, health and housing in British Columbia (BC). One of PLPH's main goals was to document the successes and challenges of various housing-related policies, and identify best practices for HIV and housing programs, services and policies to better meet the needs of people living with HIV (PLHIV).

Methods: In-depth, semi-structured interviews were conducted with 33 HIV and/or housing policy makers and service providers working in a range of community and government organizations in three BC sites (Greater Vancouver, Kamloops, and Prince George). Interviews explored the work of their organizations, successes and challenges in that work, and perspectives on policies and other influencers of housing provision for PLHIV.

Results: Participants identified integrated housing models that provide health and social services; mixed use housing in diverse communities; opportunities for partnerships and collaborations between sectors, ministries and levels of government; meaningful consultations with constituents (including PLHIV); and sustainable funding as important building blocks for the provision of healthy and affordable housing. Public ignorance around HIV (and the ensuing stigma) was identified as a key challenge to providing appropriate housing for PLHIV. Other challenges included policy makers and service providers working in silos, and government's tendency to view housing as an economic opportunity rather than a health issue.

Conclusions: Ignorance around HIV transmission and substance use, and resulting stigma and NIMBY-ism, continue to dictate where and how affordable housing is built in BC. Study findings highlight the need to consider housing as a health issue, increase coordination between policy and service sectors regarding HIV and housing, and build partnerships beyond HIV and housing sectors (e.g. law enforcement, municipal governments). Further, successful models should be scaled up to address stigma and other barriers to safe, appropriate housing for PLHIV.

EPHP10.04

Barriers to Supporting People Living with HIV Who are Experiencing Neurocognitive Challenges

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Background: An estimated 30 to 50% of people living with HIV (PLWH) are or will be affected by some form of neurocognitive decline in their lifetime, even with the use of combination antiretroviral therapy. This can be a significant stressor. Consequently, PLWH who experience neurocognitive challenges could benefit from targeted support from community-based HIV service providers.

Aim: To identify barriers providers face in supporting PLWH and neurocognitive challenges.

Method: Using a Community-Based Research approach, we conducted confidential, one-on-one interviews with 33 providers from 22 AIDS service organizations (ASOs) and community-based agencies (CBAs) across Ontario. Thematic analysis was employed to identify relevant themes from the interview data.

Results: We identified three types of barriers providers face in supporting PLWH who experience neurocognitive challenges: a) individual provider-related, b) service access-related, and c) systemic. Individual provider-related barriers include lack of awareness of and limited knowledge about neurocognitive changes among PLWH and how to support these clients. Service access-related barriers include limited availability of local primary care, mental health, and other services; limited access to services with adequate expertise and experience working with PLWH;

and stigma toward PLWH in agencies outside of dedicated HIV services. Systemic barriers entail a self-identified lack of capacity to support PLWH and neurocognitive challenges in the HIV sector.

Conclusion: Our study draws attention to obstacles to supporting PLWH and neurocognitive challenges that providers encounter, and presents the following options to overcome them: a) learning and staying informed about neurocognitive challenges among PLWH, b) partnering with ASOs and CBAs with mental health and other support services, and c) advocating for policies and programs to facilitate greater access to providers with adequate expertise and experience working with PLWH, address stigma toward PLWH in agencies outside of HIV services, and increase capacity in the HIV sector.

EPHP10.05

Consequences of Medication Access Barriers Experienced by People Living with HIV in Ontario, Canada

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Background: In Ontario, HIV medications can cost up to $2000/month, and many people living with HIV (PLHIV) are increasingly in need of medications for other comorbid conditions. Due to the lack of universal pharmacare, PLHIV in Ontario may have unequal financial burdens in accessing their medications. Challenges with medication access and its consequences were identified using concept mapping (CM) methodology.

Methods: CM sessions were conducted across four sites in Ontario: Toronto, Ottawa, Windsor, and Thunder Bay. Healthcare providers and sub-groups of PLHIV participated including newly diagnosed PLHIV, long-term survivors, immigrants, PLHIV from ethno-racial communities, and people who use drugs. During CM sessions, participants generated statements in response to "*People living with HIV need to take medication for HIV and other medications. Some people with HIV have trouble getting and paying for prescription drugs because…*" Consequences of poor treatment access were identified from the generated statements.

Results: In total, 68 participants generated 447 statements. The majority of participants were White (49%), taking 3+ medications (43%), and accessing medication through the Ontario Disability Support Program (54%) or Trillium Drug Program (15%). Over 20% of statements identified the barriers to treatment access and their direct consequences. The consequences included the inability to obtain prescriptions from providers, inability to pay for medication associated costs including deductibles, need to rely on government assistance, compromised basic needs, inability to access services, and need to travel greater distance to access services. When faced with access challenges, some PLHIV decided to skip and ration medications, or discontinue therapy for an extended period.

Discussion: Medication access issues experienced by Ontarian PLHIV differ based on social and geographical position. The unequal access to medications may have broader impacts on determinants of health among PLHIV, and this may undermine the quality of life and other health-related outcomes.

EPHP10.06

"The Road to Masiphumulele": Processes of Video Knowledge Translation in HIV Vaccine Trials in South Africa—Social, Ethical and Emancipatory Dimensions

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Background: Videos are an increasingly important knowledge translation (KT) tool, particularly relevant in community-based research (CBR) in low- and middle-income countries—due to barriers in access to scholarly publications, prevalent HIV stigma and marginalization. Limited Video-KT guidelines in scientific research focus on technical dimensions rather than ethical and participatory processes. We examined lessons learned and best practices from integration of Video-KT in a Canadian HIV Vaccine Initiative Team Grant in South Africa.

Methods: From 2012-2017 we formed international partnerships with 12 researchers from 3 universities, and 3 community-based organizations (CBOs), in Cape Town, Durban and neighboring townships. We reviewed field notes, team-meeting minutes and semi-structured interview recordings to examine and assess processes and challenges in Video-KT with research and community partners, and Video-KT products.

Results: We produced five 1.5–6-minute professional-quality videos (2-minute extract screening). Video-KT content included researchers explaining the project (i.e., new prevention technologies; community engagement) and its impact; voices/images of community partners describing their roles and insights; on-screen references to team publications; and coherent narratives describing findings.

Best practices included: 1) transparency and trust-building through in-country and cross-national academic-community team meetings; 2) addressing site-specific historical contexts of HIV epidemiology and mistrust of research/ers; 3) planning/sequestering a Video-KT budget and engaging a professional videographer; 4) team co-development of video content and shooting guidelines; 5) intensive co-development/ongoing evaluation of participatory consent processes; 6) video 'member checking'; and, 7) final-cut decision-making and shared ownership with academic and community partners.

Conclusions: Video-KT in CBR is a participatory process and a shared product. Addressing challenges due to HIV stigma, medical mistrust and marginalization requires critical attention to power dynamics (researcher/community; international/domestic), trust-building, consent processes, shared control and ownership. Video-KT products can 'outlive' and extend the bounds of traditional scholarly venues, and may serve as mechanisms for community empowerment and meaningful stakeholder engagement.

EPHP10.07

Correlates of Benzodiazepine and Opioid Co-Prescription Among People Living with HIV in British Columbia, Canada

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Background: The co-prescription of benzodiazepine and opioid is relatively contraindicated due to the possible overdose risk. However, people living with HIV (PLWH) may have concurrent psychiatric or chronic pain diagnoses that require the use of either benzodiazepine or opioid. Consequently, some PLWH may be at-risk for the health harms associated with the co-prescribing of these medications. The objective of this study is to characterize patient factors associated with the co-prescribing of benzodiazepine and opioid among PLWH in British Columbia (BC).

Methods: Using data derived from the Seek and Treat for Optimal Prevention HIV/AIDS in BC cohort, we used bivariable and multivariable generalized estimating equation models to establish the prevalence of a benzodiazepine and opioid co-prescription and determine factors associated with this practice.

Results: Between 1996 and 2015, 14,701 PLWH were included in the study. At baseline, 30.1% were prescribed neither medication, 19.6% were prescribed benzodiazepines only, 46.3% were prescribed opioids only, and 4.0% were co-prescribed benzodiazepines and opioids. Factors associated with co-prescription are displayed in Table 1.

Table 1 Multivariable GEE analyses of factors associated with co-prescription of benzodiazepine and opioid

Variable	Adjusted Odds Ratio (AOR)	95% Confidence Interval (CI)
Gender (Male vs female)	1.21	[1.07-1.37]
Depression/Mood disorder (no vs yes)	1.12	[1.05-1.19]
Anxiety disorder (no vs yes)	1.63	[1.50-1.76]
Substance use disorder (no vs yes)	1.66	[1.53-1.79]
Age at study baseline (10 years)	1.05	[1.00-1.11]
Calendar year (10 years)	0.73	[0.67-0.78]
Charlson comorbidity index	1.09	[1.07-1.11]
CD4 cell count (100 cells/mm^3)	1.01	[1.00-1.03]

Discussion: Co-prescription of a benzodiazepine and opioid was seen in a minority of patients, and was positively associated with being female, and having a substance use or an anxiety disorder. Given the risks associated with co-prescribing and the common comorbidities in PLHIV where these medications may be indicated, careful consideration should be taken prior to co-prescribing, and patients should be diagnosed and treated for addiction routinely. Future research should seek to explore co-prescription practices in order to determine their appropriateness in these circumstances.

Public Health Ethics

Éthique en santé publique

EPHP11.01

Ethical Considerations in Community-Based Biological HIV Surveillance and Research

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Background: Population-specific bio-behavioral surveillance, inclusive of biospecimen testing, is a cornerstone to monitoring the HIV epidemic and evaluating public health responses. Canada has led the development of community-based research practices, but these have not been applied within surveillance among gay, bisexual, and other men who have sex with men (GBMSM). Shifting ethical challenges in providing test results to participants in HIV surveillance studies must be considered.

Methods: Sex Now 2018, an anonymous, pan-Canadian, cross-sectional health survey of GBMSM, will measure HIV prevalence through in-person dried-blood spot (DBS) testing. Academic and community-based researchers, laboratory testing professionals, research ethics board staff, and

public health professionals were consulted to identify ethical responsibilities and limitations in providing results to participants.

Results: The research team recognized the importance of beneficence and nonmaleficence as guiding ethical principles. Consultations outlined three important themes:

1. Participant autonomy: Participants should have the choice to access their test results or not. While DBS HIV testing in Sex Now 2018 is not a diagnostic test, it may be a first point of testing, particularly for participants without regular access to services. A clear and easy-to-understand informed consent process must be developed for those who request to 'opt-in' to receive their results.
2. Access to health services: Participants unaware of their HIV-positive status must be meaningfully linked to clinical care. Delivery of test results, if long delayed after testing, raises questions about utility and other unanticipated consequences for those who test positive.
3. Confidentiality: Identifying information collected in order to provide results must be kept confidential. However, this may pose barriers to participation, as Sex Now 2018 overall is anonymous.

Conclusion: Participant autonomy, access to GBMSM-culturally competent health services, and confidentiality must be carefully evaluated and balanced when determining best practice for providing results, particularly to those unaware of their HIV-positive status.

Social Epidemiology of HIV Infection (Structural, Social and Individual Determinants)

Épidémiologie sociale de l'infection au VIH (déterminants structurels, sociaux et individuels)

EPHP12.01

Sociodemographic Correlates of Housing Satisfaction from a Study of an HIV-Specific Supportive Housing Intervention in Vancouver, Canada

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Background: Housing stability is an established correlate of HIV-related clinical outcomes. Previous research has identified housing satisfaction as an important component of housing stability. Longitudinal data gathered from people living with HIV/AIDS (PLHIV) enrolled in the At Home At Howe study were examined to determine the sociodemographic correlates of housing satisfaction within a supportive housing facility in Vancouver, Canada.

Methods: The At Home at Howe study evaluates the impact of supportive housing among PLHIV at risk of homelessness. Peer Research Associates interviewed residents of an HIV-specific housing facility at baseline and follow-up. Housing satisfaction was measured using 17 questions, which were scored and converted into a five-level ordinal outcome variable measuring degree of change in housing satisfaction between baseline and follow-up. Ordinal logistic regression was used to examine the relationship between sociodemographic correlates and changes in housing satisfaction.

Results: Fifty-nine participants (12 women, 44 men, and three gender-diverse persons) were included in this analysis. Univariate ordinal logistic regression demonstrated that PLHIV who had experienced homelessness had 4.94 (95% CI: 1.29, 18.90) the odds of a less favourable change in satisfaction score (i.e., either a decrease in satisfaction or a less substantial increase in satisfaction) compared to persons without a history of homelessness. Ethnic and racial minorities (not including Indigenous participants) had 0.21 (95% CI: 0.05, 0.96) the odds of a less favourable change in satisfaction compared to Caucasian participants. Indigeneity, gender, sexual orientation, education, and employment status were not significantly associated with changes in housing satisfaction scores over time.

Conclusions: Despite the study's limited sample size, our unadjusted model indicates that the social and environmental conditions of the housing facility may be more amenable to tenants with more stable housing histories. Further research is needed to control for confounders and identify the factors contributing to satisfaction among different sociodemographic groups.

EPHP12.02

Differences in HIV Transmission Risks in ACB Populations Post-Arrival in Canada: A "One Size Fits All" Prevention Strategy Doesn't Fit Everyone

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Background: Phase 1 of MSAFIRI found that over a third of infections among ACB are acquired post-arrival in Canada but little is known about their risk factors for acquisition.

Objective: To characterize HIV acquisition among ACB populations post-arrival or born in Canada.

Methods: Interviews were conducted with HIV-positive men and women infected post-arrival/born in Canada who were in clinical care at five large HIV clinics in Ontario. We report overall patterns and risk factors for HIV acquisition and statistically-significant differences between gender, sexual orientation, and regional ancestry.

Results: Of the 108 participants, 73% were males; 28% were born in Canada, 49% were born in the Caribbean, and 21% in Africa. 37% identified as gay, 26% straight-men, 26% straight-women, and 7% bisexual. Post-arrival patterns of infections are more heterogeneous than pre-arrival, with higher rates occurring among men-who-have-sex-with-men (MSM). Modes of infection post-arrival include: 45% MSM, 39% heterosexual (26% females, 13% men), 11% MSM-IDU, and 5% IDU. MSM acquisition was more common among those of Caribbean origin. Patterns of infection (based on year of diagnosis) have remained consistent over time with the exception of declining IDU transmissions. Condom use was low among all groups and lowest among women. Only 12% were aware their partner was infected. The majority of source partners were: Canadian residents (lowest among women); 55% were Black and 30% White. Heterosexual men were more likely to report a White source partner and heterosexual women a Black partner. Sex between Africans and Caribbean was low.

Conclusions: We now have a clear picture of the patterns and risk factors for acquisition among ACB populations post-arrival which may inform more targeted HIV prevention strategies. Results show differences between those of African and Caribbean origin, MSM and heterosexual men, and heterosexual men and women mandating address to the heterogeneous risks within ACB communities.

EPHP12.03

HIV-Related Knowledge in Nigeria: A 2003-2013 Trend Analysis

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Background: Given Nigeria's status as the country with the second highest number of people living with HIV globally, and 9% of the total global burden of HIV being attributable to Nigeria alone in 2013, improving our understanding of the nature of the HIV epidemic in Nigeria is crucial. As HIV-related knowledge may be an important contributor to engagement in preventive behaviours, it is of interest to investigate trends in HIV-related knowledge in Nigeria with the purpose of informing future HIV prevention and education efforts.

Objective: To investigate trends in HIV-related knowledge in Nigeria between 2003 and 2013.

Methodology: Data was derived from the 2003-2013 Nigerian Demographic and Health Surveys, and HIV-related knowledge scores were computed based on answers to HIV-related knowledge questions in the surveys. The significance of the difference between HIV-related knowledge across the time points was determined via the Kruskal-Wallis test, and changes in HIV-related knowledge were displayed graphically, stratified by relevant socio-demographic characteristics. ARIMA models were fit to the 2003 to 2013 trend data.

Results: Although there was a generally a decrease in HIV-related knowledge across most knowledge domains in 2008, an overall increase was observed between 2003 and 2013. Unfortunately however, this was not the case for knowledge of mother-to-child transmission, which decreased between 2003 and 2013. The disparity in knowledge of HIV risk reduction between states also increased over time.

Conclusion: These findings suggest that although HIV-related knowledge appears to be increasing overall, future HIV prevention and education programs should focus on specific knowledge domains such as mother-to-child transmission, and on specific states in which HIV-related knowledge remains low.

EPHP12.04

Social Determinants of Health and Self-Rated Health Status: A Comparison between Women Living with HIV and Women from the General Population in Canada

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Background: Women with HIV face inequities across the HIV care cascade and health outcomes compared with men. A substantial proportion of these outcomes may be due to unique social-structural barriers that impact their health and wellbeing. We compared self-reported health status and social-structural determinants of health between women with HIV and expected general population values.

Methods: Multiple measures of social-structural determinants and self-rated health status were estimated using 2013-2015 data from 1,422 women living with HIV aged ≥16 enrolled in the Canadian HIV Women's Sexual and Reproductive Health (CHIWOS). These determinants were compared with estimates from 46,831 women of the general population (assumed HIV-negative) from the 2013-2014 Canadian Community Health Survey (CCHS), standardized to the age and ethnoracial group distribution of

the CHIWOS sample. Standardized proportion differences (SPDs) were reported.

Results: A higher proportion of women with HIV compared with estimates expected based on the age/ethnoracial-standardized assumed HIV-negative women reported annual personal income <$20,000 (70.3% vs. 28.1%; SPD 42.2%), indicating that 42.2% of WLWH experienced this low income, in excess of what would be expected of Canadian women of similar ages and ethnoracial backgrounds. Additionally, a higher proportion of women with HIV reported severe food insecurity (54.1% vs. 10.2%; SPD 43.9%), poor perceived social support (30.3% 2.9%; SPD 27.4%), and frequent racial (46.4% vs. 9.6%; SPD 36.8%) and gender (53.2% vs. 8.4%; SPD 44.8%) discrimination. Finally, women with HIV reported a higher proportion of poor/fair health status than the general population of women (24.8% vs. 12.6%; SPD 12.2%).

Conclusions: Significant social-structural inequalities were found among women with HIV as compared to their assumed HIV-negative counterparts in the general population. These findings support the integration of a social-determinants-of-health approach into HIV care, social service delivery, and programming, with additional resource allocation tailored to the particular needs of this population.

EPHP12.05

Awareness, Interest, and Willingness to Pay for Pre-Exposure Prophylaxis in a Community-Based Sample of Canadian Gay, Bisexual, and Other Men who have Sex with Men

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Background: Pre-exposure prophylaxis (PrEP) is a highly-effective, HIV prevention strategy increasingly utilized by gay, bisexual, and other men who have sex with men (GBMSM). GBMSM face structural and individual-level barriers accessing PrEP, including awareness and cost. Our objective was to assess socio-demographic factors associated with awareness, interest, and willingness to pay for PrEP among Canadian GBMSM.

Methods: Data were derived from an online, a cross-sectional, survey of Canadian GBMSM. Respondents were recruited through social media, sex-seeking "apps", and word of mouth. We used univariable and multivariable logistic regression to estimate associations between socio-demographic factors and awareness, interest, and willingness to pay for PrEP.

Results: Our sample consisted of 7,176 HIV-negative/untested Canadian GBMSM. Overall, 54.7% of respondents were aware and 47.4% were interested in PrEP. Only 27.9% of PrEP-interested respondents reported they would pay for PrEP out-of-pocket. Awareness and interest varied between provinces. GBMSM in suburban areas (aOR 0.73 95%, CI 0.64-0.83) and small cities/towns (aOR 0.68, 95% CI 0.60-0.78) were less likely to be PrEP-aware compared to respondents living in urban areas. Bisexual-identified men were less likely to be aware (aOR 0.47 95% CI 0.42-0.52) and interested (aOR 0.80, 95% CI 0.72-0.90) in PrEP. Similarly, GBMSM over 50 were less likely to be aware (aOR 0.44, 95% CI 0.38-0.50) and interested (aOR 0.80, 95% CI 0.70-0.92) in PrEP. Only higher annual income (aOR 2.07 95% CI 1.54-2.78) and educational attainment (aOR 1.91 95% CI 1.30-3.10) were associated with willingness to pay for PrEP out-of-pocket.

Conclusion: This study identifies important disparities in awareness, interest, and willingness to pay for PrEP among Canadian GBMSM. Future interventions should target non-gay-identified and older GBMSM, and GBMSM outside urban areas. PrEP implementation may risk perpetuating health inequities based on socioeconomic status if PrEP continues to be accessed primarily through private insurance or paid for out-of-pocket.

EPHP12.06

Awareness and Acceptability of Pre-Exposure Prophylaxis among Gay, Bisexual and Other Men who have Sex with Men in Vancouver, BC: Implications for Implementation

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Background: Pre-exposure prophylaxis (PrEP) is recommended as an HIV prevention strategy for at-risk gay, bisexual, and other men who have sex with men (GBMSM). Despite its efficacy, barriers to uptake–including awareness, cost, and preferred mode to access PrEP–remain. This study evaluates the level of knowledge surrounding PrEP among at-risk GBMSM living in Vancouver, Canada.

Methods: Data were derived from a cross-sectional survey of HIV-negative GBMSM living in Vancouver, Canada. Respondents were recruited in-person at three sexual health clinics and at bathhouses, between March-December 2017. Descriptive statistics for awareness, interest, and preferred mode of access (i.e., through family doctor, dedicated PrEP clinic, or sexual health clinics) were stratified by location of recruitment, and willingness to pay for PrEP was evaluated. HIRI score ≥10 was used to define 'at risk' for HIV.

Results: 511 GBMSM were included in the study, with 72% (n=367) recruited in STI clinics. The median age was 32 years (interquartile range 26-40 years). With regard to

risk, 79% of respondents had HIRI score ≥10 (26% had HIRI score ≥25), and 54.9% reported prior STI. Overall, 83% of respondents were aware of PrEP and 81% would use PrEP if free of charge. Of those willing to pay for PrEP, 71% reported they would only pay <$100/month. Preferred venue for accessing PrEP differed by location of recruitment. 70.5% of STI clinic respondents reported sexual health clinics as most acceptable, compared to 46% of bathhouse respondents (P<0.001). Conversely, 29% of bathhouse respondents reported family physicians as most acceptable, compared to 15% of STI clinic respondents (P<0.001). Only 11% of respondents preferred a stand-alone PrEP clinic.

Conclusion: Awareness, and interest in using PrEP if free of charge, was high amongst at-risk GBMSM. To maximize PrEP uptake, a variety of distribution models should be considered, including PrEP offered through sexual health clinics.

EPHP12.07

Higher Prevalence of Mood and/or Anxiety Disorders among Individuals Vulnerable to Acquire HIV in Canada

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Background: People living with HIV are at increased risk of mood and/or anxiety disorders. We examined the impact of vulnerability to HIV and other social determinants of health on the prevalence of mood and/or anxiety disorders in Canada.

Methods: A retrospective cross-sectional study was conducted using the 2013-2014 Canadian Community Health Survey, restricted to participants aged ≥18 years with complete responses (total: 38,984 unweighted and 12,624,699 weighted participants). The outcome was self-reported mood and/or anxiety disorder diagnosis. The main covariate was vulnerability to HIV, a new indicator that we created, based on known HIV risk factors (i.e., age of first sexual intercourse, condom use, sexually transmitted infection diagnosis, multiple sexual partners, and use of hard drugs). Explanatory logistic regression models identified factors associated with the outcome.

Results: Of the weighted sample (12, 624, 669), 5% of participants were identified as vulnerable to HIV and 12% reported a mood and/or anxiety disorder diagnosis. The most significant modifiable factors associated with the outcome included vulnerability to HIV (>70% higher

Table: Adjusted Odds Ratios (aOR) for Mood and/or Anxiety Disorder Diagnosis

Characteristic		aOR for Mood and/or Anxiety Disorder Diagnosis	
		Model without household food security variable*	Model with household food security variable
Vulnerable to HIV acquisition	No	1.00 (-)	1.00 (-)
	Yes	1.87 (1.50 - 2.32)	1.70 (1.34 - 2.17)
Sexual identity	Heterosexual	1.00 (-)	1.00 (-)
	Gay, bisexual and other men who have sex with men	2.57 (2.01 - 3.29)	2.52 (1.88 - 3.37)
Sex	Male	1.00 (-)	1.00 (-)
	Female	1.72 (1.53 - 1.93)	1.79 (1.57 - 2.04)
Marital status	Single	1.00 (-)	1.00 (-)
	Married/common-law	0.83 (0.73 - 0.94)	0.79 (0.67 - 0.93)
	Widowed/separated/ divorced	1.22 (0.99 - 1.49)	1.05 (0.81 - 1.36)
Education attainment	< Post-secondary graduation	NS	NS
	Any post-secondary graduation	NS	NS
Poverty	No	1.00 (-)	1.00 (-)
	Yes	1.54 (1.18 - 2.01)	1.44 (1.07 - 1.95)
Household food security status	Food secure	NA	1.00 (-)
	Food insecure	NA	2.44 (2.05 - 2.91)
Cultural and racial origin	Caucasian	1.00 (-)	1.00 (-)
	Non-Caucasian	0.45 (0.34 - 0.60)	0.38 (0.27 - 0.53)
Immigrant	No	1.00 (-)	1.00 (-)
	Yes	0.75 (0.58 - 0.96)	0.78 (0.58 - 1.04)
Region	Ontario	1.00 (-)	1.00 (-)
	Québec	0.62 (0.53 - 0.72)	0.62 (0.53 - 0.73)
	British Columbia	1.10 (0.93 - 1.31)	NA
	Atlantic	1.02 (0.88 - 1.19)	1.08 (0.91 - 1.27)
	Prairies	0.76 (0.65 - 0.89)	0.77 (0.65 - 0.91)
	Northern Territories	0.75 (0.54 - 1.03)	0.67 (0.40 - 1.12)
Urban-rural status	Urban	1.00 (-)	1.00 (-)
	Rural	0.81 (0.72 - 0.92)	0.82 (0.71 - 0.95)
Self-perceived general health	Excellent	1.00 (-)	1.00 (-)
	Very good	2.22 (1.84 - 2.67)	2.15 (1.75 - 2.64)
	Good	4.32 (3.56 - 5.25)	3.92 (3.16 - 4.87)
	Fair	11.39 (8.98 - 14.44)	9.42 (7.23 - 12.27)
	Poor	16.46 (11.85 - 22.86)	13.93 (9.17 - 21.15)
Sense of belonging to the community	Strong	1.00 (-)	1.00 (-)
	Weak	1.30 (1.17 - 1.45)	1.29 (1.14 - 1.46)
Regular medical doctor	Yes	1.00 (-)	1.00 (-)
	No	0.56 (0.48 - 0.66)	0.51 (0.43 - 0.62)
Depression scale	Per 1 unit	1.42 (1.36 - 1.47)	1.39 (1.32 - 1.45)
Age	Per 10 years	NS	1.06 (0.98 - 1.15)

*The household food security status variable was an optional content to the CCHS 2013-14, and not included in the surveys for British Columbia, Manitoba, Newfoundland and Yukon. Note: NS: not selected; NA: not applicable; aOR: Adjusted odds ratios

odds relative to those non-vulnerable) and food insecurity (144% increased odds relative to those with food security) (**Table**). Interestingly, among non-modifiable factors, gay, bisexual and other men who have sex with men (gbMSM) had >152% higher odds relative to heterosexuals of reporting a mood and/or anxiety disorder.

Conclusion: Tailoring strategies to reduce vulnerability to HIV, reduce food insecurity, and meet the needs of particular social minority groups (e.g., gbMSM, women, and non-Caucasians) are needed to decrease the prevalence of mood and/or anxiety disorders.

EPHP12.08

Challenges with Affording HIV Medications Among Participants in the Ontario HIV Treatment Network Cohort Study (OCS)

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Background: We investigated challenges associated with paying for antiretroviral therapy (ART) in Ontario where there is no universal coverage for prescription drugs used outside of the hospital. Ontarians with less than 100% private insurance may be eligible for a coverage plan through the Ontario Drug Benefit (ODB) program.

Methods: Participants enrolled in the OCS were included if they completed a baseline interview from February 2016 - November 2017. Participants were categorized as either having difficulty paying for ART if they reported that it was extremely, very, or somewhat difficult to pay in the past year or not having difficulty if they responded it was not too difficult or not at all. Chi-square tests were used to explore bivariate associations between demographic, socio-economic and type of coverage with reported difficulty to pay for ART.

Results: Of the 2338 participants included, the median age (interquartile range) was 52 (43-58) and 19% were female. Approximately 16%, 33%, and 39% reported coverage through Trillium, an employer, or an assistance program through ODB, respectively. An estimated 15% of participants reported having difficulty paying for ART in the past year. Of these, 22%, 23% and 18% reported delaying, not filling their prescriptions, or having to choose between paying for medications or other needs respectively, as a result. The following factors were associated with difficulty paying for ART (all $p<0.01$): self-reporting a non-binary gender or sexual minority, being African, Caribbean or Black or Other ethnicity, an annual household income of $40,000-<$60,000, being on ODB, and not having employer coverage.

Discussion: We found that 15% of participants in care had experienced difficulty paying for their ART and as a result, had to choose between filling their prescriptions and other competing needs. Policies that remove cost-related barriers to medication access, such as universal programs, are needed in our setting.

EPHP12.09

The Cedar Project: Exploring HIV Related Vulnerabilities Associated with Post-traumatic Stress Among Young Indigenous People Who Use Drugs in British Columbia

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Objective: To explore HIV-related vulnerabilities associated with Post-Traumatic Stress Disorder (PTSD) among young Indigenous women and men in British Columbia (BC).

Methods: The Cedar Project is an ongoing cohort study involving young Indigenous people who use drugs in BC. This cross-sectional study included data collected between August 2015-October 2016. The PTSD Civilian Checklist Version, a 17-item self-administered measure with symptom severity score ranging from 17-85, was used to screen participants for PTSD. The PTSD score was dichotomized, with a score of 30 or above indicating probable PTSD. Logistic regression models examined the relationship between HIV-related vulnerabilities and PTSD after adjusting for confounders. Variables significant at $p<0.10$ level were included in stepwise variable selection. Unadjusted and adjusted odds ratios (UOR/AOR) and 95% CI were calculated.

Results: Among 316 participants (183 women, 133 men), 47% had a parent who attended residential school and 75% had been in in foster care. PTSD scores ≥30 were reported among 72% of women and 62% of men ($p=0.08$). Median PTSD scores were 39 for women and 34 for men. In unadjusted analyses, women with probable PTSD were more likely to be physically assaulted in past 6 months,

and ever overdose; men with probable PTSD were more likely to be younger and use non-injection crystal methamphetamine. In adjusted analyses, women with probable PTSD were more likely to have been sexually abused as a child (AOR:4.64; 95%CI: 1.78-13.02), and had ever attempted suicide (AOR:3.99; 95%CI: 1.57-11.03). Men with probable PTSD were more likely to have slept on the streets for >3 nights in past 6 months (AOR:3.96; 95%CI: 1.48-12.03), and had ever attempted suicide (AOR:3.70; 95%CI: 1.50-9.83).

Conclusion: Prevalence of probable PTSD among young Indigenous people who use drugs in this study is alarming. Culturally-safe interventions addressing HIV-related vulnerabilities rooted in historical and complex traumas are urgently required.

EPHP12.10

Area-Level Socio-economic Deprivation is Associated with Lower Rates of HAART Prescription: a Population-based Analysis

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Introduction: Prescription of highly-active antiretroviral treatment (HAART) is one of the hallmarks of the 90-90-90 initiative. Understanding determinants of HAART prescription would inform better service delivery.

Methods: Data were from a cohort of individuals residing in Winnipeg and receiving care from the Manitoba HIV Program (MHP). Area-level deprivation was measured using the socio-economic factor index (SEFI-2), categorized into quartiles. Participants were geo-coded by postal code. Using HAART prescription ever as outcome, multivariable generalized linear models examined the association between SEFI-2 quartiles and HAART prescription, adjusted for socio-demographic and clinical characteristics. Adjusted prevalence ratios (APR) and 95% confidence intervals (95%CI) are reported.

Results: Results include 583 participants. Overall, 97% of participants ever received HAART. Bivariate analyses detected an association between HAART prescription and SEFI-2 quartiles (p<.05). Approximately 91% of participants living in areas within the lowest SEFI-2 quartile were prescribed HAART, compared to 97% of participants in the next highest quartile. This association remained statistically significant in multivariable models (Table). Compared to residents of the lowest quartile, participants in the next highest quartile were 6% (APR: 1.06; 95%CI: 1.01-1.10) more likely to have been prescribed HAART. This association was robust to sensitivity analyses using tertiles and quintiles of SEFI-2.

	Adjusted Prevalence Ratio (APR)	95% Confidence Interval (95%CI)
Quartile		
1 (lowest)	*Ref*	--
2	1.06	(1.01-1.10)
3	1.05	(1.01-1.10)
4 (highest)	1.05	(1.01-1.10)
Age (years)	1.01	(0.999-1.003)
Sex		
Male	*Ref*	--
Female	1.02	(0.98-1.05)
Year of program entry	0.998	(0.996-1.001)
HIV Risk Exposure		
Heterosexual	*Ref*	--
Men who have sex with men (MSM)	1.00	(0.971-1.03)
Injection drug use	1.01	(0.96-1.06)
MSM/Injection drug use	0.97	(0.85-1.11)
Log of initial CD4 count at program entry	0.99	(0.98-0.997)
Alcohol use		
No	*Ref*	--
Yes	1.01	(0.98-1.04)
Substance use		
No	*Ref*	--
Yes	1.00	(0.97-1.04)
Comorbid conditions (type II diabetes, hypertension, coronary artery disease, chronic kidney disease, asthma/COPD, and congestive heart failure)		
No	*Ref*	--
Yes	1.01	(0.98-1.03)
Opportunistic infections (cryptococcal meningitis, oral or esophageal candidiasis, Pneumocystis jiroveci pneumonia, and Mycobacterium Avium Intracellulare)		
No	*Ref*	--
Yes	0.98	(0.95-1.02)
Mental health diagnoses (schizophrenia, anxiety disorder, depression and bipolar disorder)		
No	*Ref*	--
Yes	1.01	(0.98-1.03)

Discussion: Although a substantial proportion of urban participants in MHP were receiving HAART, inequitable access to treatment remains within certain geographic areas of Winnipeg. Alongside focussed efforts to engage individuals residing in areas of greater socio-economic distress in HIV care, universal access to HAART would further support maintenance of the 90-90-90 targets.

Other

Autres

EPHP13.01

Measuring HIV 90-90-90 Estimates in Canada; a Knowledge Exchange Forum to Explore Lessons Learned and Ways Forward

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Introduction: In 2014, the UNAIDS and WHO established new global targets to generate momentum towards ending the HIV/AIDS epidemic by 2030. By 2020, 90% of all people living with HIV will know their status, of those 90% will receive antiretroviral treatment, and of those 90% will have achieved viral suppression. The Minister of Health announced that Canada would endorse the 90-90-90 targets, and a national exercise to measure the Canadian estimates began. First national estimates were released by the Public Health Agency of Canada in 2016.

Methods: To provide an opportunity for provinces and territories to debrief and share lessons learned from the development of the 90-90-90 estimates, the National Collaborating Centre for Infectious Diseases convened a knowledge exchange forum in April 2017. Twenty-one participants from federal/provincial/territorial epidemiology units gathered in Winnipeg to describe their jurisdiction's approaches for generating the 90-90-90 estimates.

Results: Provinces and territories differed in their capacity and structures to measure the estimates, in how they defined indicators due to varying data sources, and in their ability to retrieve data. All jurisdictions reported facing legal/privacy challenges to access and link data sources. Variation in data sources introduced variability in indicator definitions, limiting capacity to compare across provinces and territories and in tracking progress. Participants recognized that the estimates would need to be refined to monitor successes and failures effectively along the continuum of care. Three priority areas were identified for continued efforts: 1) defining common metrics and refining methods; 2) reducing legal constraints for timely access to datasets, including key population-specific and geographical information; and 3) building on the momentum to leverage stakeholders buy-in, identify scalable programs, and align policies.

Conclusion: This meeting helped identify ways forward to improve cohesion in reporting of the 90-90-90 estimates, and track progress in HIV prevention, care and treatment in Canada.

Social Sciences

Sciences sociales

Behavioural and Social Intervention Research

Recherche en intervention sociale et comportementale

SSP1.01

Association of Psychological Distress and Cognitive Impairment Among Adults Living with HIV

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Background: Despite highly active antiretroviral therapies, cognitive impairments and psychological distress (depression and anxiety) commonly occur in HIV-infected individuals that may signal a potential association between these conditions. The purpose of this study was therefore to review and synthesize research evidence regarding the relation between depression/anxiety and cognitive impairment among people with HIV.

Methods: A systematic search of Medline, PsychInfo, Embase and CINAHL was conducted. Studies were included if they meet the following criteria: (1) reported in an original paper in a peer-reviewed journal; (2) addressed association between depression and/or anxiety AND cognitive function; (3) targeted adults (> 18 years) living with HIV; (4) English articles published in last decade (2008-2017). Case reports and review papers were excluded. PRIMSA guidelines for the literature search were used. Two independent reviewers evaluated 2456 citations for eligibility and extracted data from the eligible studies.

Results: 38 studies met the inclusion criteria. 24 studies found a significant association between presence of depression and at impairments in least one domain of cognition. 10 studies reported association between anxiety and cognitive deficits. 8 articles reported no association between depression and cognitive impairment, and 2 studies reported no association between anxiety and cognitive impairment. Only one addressed this relation in the opposite direction, i.e., presence of cognitive impairment to be associated with development or deterioration of depression and found no association. Significant correlations between depression were found in the domains of processing speed and motor, but there were discrepancies for other domains of cognition.

Limitations: There were few studies meeting inclusion criteria in some cognitive domains, papers had to be excluded due to insufficient data reporting, and there were limitations associated with the cross-sectional design.

Conclusions: Studies examining association of cognitive impairment with depression or anxiety among people with HIV have produced inconsistent findings.

SSP1.02

Tensions in How Potential Users and Service Providers Perceive the Utility and Acceptability of Online HIV/STI Personalized Risk Self-Assessment Tools

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Objective: Online sexual health literacy tools may potentially increase awareness of HIV/STI prevention and testing strategies, but relatively little is known about how people perceive these tools. We assessed perceptions regarding the utility and acceptability of online personalized risk self-assessment (PRS) tools to prevent HIV/STI.

Methods: Five focus groups were conducted in Vancouver, Canada, with 5 HIV/STI prevention service providers and 12 potential users (4 youth, 3 gay men, 5 STI clinic clients) of PRS tools. Participants interacted with 5 online HIV/STI PRS tools selected for their varied target audiences, completion lengths, and recommendation messages. Discussions centred on expectations, use contexts, perceived benefits and drawbacks, and tools' features. Participants also interacted with and discussed a BC-specific PRS tool. Session transcripts were examined to determine patterns and themes using an interpretive description approach.

Results: We found four tensions concerning the utility and acceptability of PRS tools across socio-demographic groups. First, most potential users had no previous knowledge of PRS tools, while service providers were familiar with them but emphasized messaging and design challenges. Second, some participants expected PRS tools to provide information about specific encounters or symptoms, while others anticipated general guidance on sexual behaviours and HIV/STI prevention. Third, participants distinguished between PRS tools that they perceived as over-emphasizing "risks" and scolding users, and those that enabled users to learn about HIV/STI "chances" and were viewed as sex-positive. Fourth, while participants often searched for sexual health information online, most saw online PRS tools as "a first step only" that could not replace testing recommendations provided by nurses and doctors.

Conclusions: While perceptions of PRS tools varied within socio-demographic groups, tensions around knowledge, expectations, underlying messaging framing, and willingness-to-use were found across groups. These tensions suggest both a niche use of PRS tools and a need for more careful development.

SSP1.03

Supporting Choices About Workplace Disclosure of HIV Status: A Cross-Canada Survey

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Background: Choices about self-disclosure of HIV status in the workplace are highly contextual and complex decisions.

Purpose: We aimed to understand current practices in supporting people living with HIV to make choices about workplace disclosure.

Methods: We sent invitations for an online survey to 212 e-mail addresses of people with knowledge in this area, identified through websites and research team contacts. Questions covered experiences supporting disclosure decisions, confidence in resources available for disclosure decision-making, and strategies for supporting workplace disclosure decisions. We analyzed data descriptively and with Mann-Whitney U tests. Open-ended responses were themed using inductive qualitative methods.

Findings: Of the 94 survey respondents, 26% reported that they were living with HIV; 77% of all respondents worked for HIV-specific organizations. Thirty-three percent of respondents were only a little or not confident in their ability to support people in making disclosure decisions and 32% expressed little or no confidence in the resources available. Respondents working at HIV-specific organizations, as compared to respondents not working at those organizations, were more confident supporting people with disclosure decisions and in the available resources, $p<.05$. Respondents living with HIV had more experience and were more confident in their abilities, and the resources available, to support others in workplace disclosure decisions, $p<.05$. Themed responses to open-ended questions identified stigma, fear, lack of knowledge and support, and personal factors as barriers. Personal, workplace and societal factors were identified as relevant supports to disclosure decision-making.

Conclusions: Survey results identified gaps in supports and resources for workplace disclosure decision-making, particularly external to HIV-specific organizations. This is an important limitation for people who do not access these organizations because of lack of geographic availability or due to their choice not to do so. Peers have important roles in support and access to resources for decisions about workplace disclosure.

SSP1.04

Motivating Factors, Goals, and Expectations Among Adults Living with HIV Prior to Engaging in a Community-Based Exercise Intervention in Toronto, Canada

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Objective: To explore motivating factors, goals and expectations among adults living with HIV prior to engaging in a community-based exercise intervention.

Methods: We conducted a descriptive qualitative study with adults living with HIV who agreed to participate in a community-based exercise (CBE) intervention study. We interviewed participants prior to initiating a 24-week intervention comprised of exercise 3 times a week, supervised once weekly by a fitness instructor at the YMCA. We asked participants to describe their goals and expectations, motivating factors, and perceived benefits or concerns prior to starting the intervention. Interviews were audio-recorded, and transcripts analyzed using thematic analysis.

Results: Eleven men and four women, with a median age of 48 years (25-75th percentile: 25-70), and common concurrent conditions of joint pain (53%), mental health (40%), and muscle pain (33%) participated. At the time of the interview, 80% of participants were not regularly engaging in exercise. We identified four main themes related to participants' determination to initiate exercise: 1) Motivating factors were linked to expected health benefits of exercise. 2) Participants' goals included improving mental health (mood, depression), emotional health (reducing isolation, loneliness) and physical health (decreasing pain, fatigue, weight). 3) Participants described "looking forward" to the structure and routine associated with the intervention, and individualized approach to exercise prescription. 4) Concerns included the ability to adhere to thrice weekly sessions among work and family commitments, fluctuations in health, and inclement weather.

Conclusions: Expected benefits to mental and emotional health were identified as motivating factors for participants preparing to engage in exercise. Structure and routine associated with a formalized CBE intervention can offer strategies to maximize control over health when living with an episodic illness. Factors that influence behavior change related to exercise are important to consider for enhancing physical activity among people living with HIV.

SSP1.05

Trauma-Informed Care Training in ASOs, Community Health Centres and with Harm Reduction Workers: Findings from a Workshop Evaluation

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While the experience of trauma is a widespread, global phenomenon, individuals living with HIV, as well as individuals who are LGBTQ, individuals who use injection drugs, and those who have marginalized status are disproportionately affected (Fallot & Harris, 2006; Hopper et al., 2009; Seedat et al., 2012). There is a clear need for service provision that is trauma competent, meaning integrating knowledge of the prevalence, impact, and outcomes of trauma, as well as psychoeducation about what trauma really is and what it does. Numerous agencies in Ontario requested Trauma-Informed Care training with their staff and volunteers, and the current project reports on the outcomes of this workshop. A total of 150 community, health, and social service providers in the HIV, Hepatitis C, LGBTQ, harm reduction and related sectors participated in a full or half day Trauma-Informed Care workshop. To establish the effectiveness of the workshop on improving attitudes towards Trauma-Informed Care, participants completed the Attitudes Related to Trauma-Informed Care scale (ARTIC-10) at pre-workshop, post-workshop, and at six months follow-up. There was a significant increase in ARTIC scores, indicating more favourable attitudes towards Trauma-Informed Care, from pre-workshop (M = 58.01, SE = 0.64) to post-workshop (M = 61.73, SE = 0.67), M = -3.72, BCa 95% CI [-4.65, -2.82], $t(149) = -7.79$, $p < .001$. This represented a medium-sized effect, d = 0.48. These gains were maintained at follow-up. These results demonstrate that a brief workshop on Trauma-Informed Care can impact attitudes over time, creating a Trauma Competent environment for clients. Future directions include assessing client outcomes as related to changes in provider attitudes.

Combining Prevention Strategies: Social Science Perspectives

Combinaison des stratégies de prévention : perspectives des sciences sociales

SSP2.01

Capacity Bridging: Reciprocal and Equitable Knowledge Sharing on a Research Team

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Background: *Capacity bridging* is a new concept being put forward by the AHA Centre (a project of the Canadian Aboriginal AIDS Network) where the familiar term *capacity building* is expanded upon to allow for a holistic incorporation of reciprocity and equitable sharing of knowledge and experience between academics, researchers, community-based researchers and community members.

Our Approach: Capacity bridging is a more inclusive and less hierarchal concept than 'capacity building', which alludes to a deficit; a need to build one's capacity without acknowledgement of the richness in skills, knowledge and experience that exists within and across our Indigenous and Mainstream HIV communities. Bridging is about reciprocity: coming together, sharing, learning from one another and listening to each other. It challenges us to think about the stories we tell ourselves about the work that we do and the communities we work with.

Findings: Often in research, the "experts" arrive prepared with a clear-cut plan of what they will do, how they will do it, what they need, and how long it will take to get it all done. This prescriptive approach to research has failed to recognize the importance and value of working together in order to learn from each other. Capacity bridging allows researchers and community opportunities to find common ground before moving forward respectfully, to do research in a good way.

Implications: The term capacity bridging, once understood, may help to break down research barriers by acknowledging that everyone has something to offer a research team or project. It looks for ways that we can extend our reach to produce more holistic and meaningful research that serves our Indigenous communities "in a good way". Capacity bridging has the potential to positively influence and affect academics and researchers and the communities their findings serve.

SSP2.02

Quantitative Investigation of Knowledge of Pre-Exposure Prophylaxis among Men who have sex with Men in Hamilton, Ontario, Canada

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Introduction: In Canada, over half of all new HIV infections occur in MSM. Truvada as pre-exposure prophylaxis (PrEP) effectively reduces the incidence of HIV infection in at-risk MSM, but uptake has been low where PrEP is available. The objective of this study is to assess degree of PrEP knowledge and willingness using sociosexual media to connect with a population of Canadian MSM living in a medium-sized city.

Methods: Recruitment occurred between October, 2016 and March, 2017. A link to a survey was sent to 250 users, via sociosexual media including Grindr and Scruff to assess knowledge and willingness to use PrEP among HIV-negative MSM living in Hamilton, Ontario, Canada.

Results: Recruitment rate was (106/160) = 66% for those that clicked the link and (106/~250) = 42% for that were sent the link. Of 90 participants, the majority of participants had heard of PrEP (94%). Knowledge was average with participants answering approximately half of the knowledge questions correctly (50.6%) The cohort was generally willing to use PrEP, especially if it were provided free-of-charge by the government (85.5%). Based on their objective risk scores, over half of the sample (53.3%) qualified for PrEP consultation according to the HIRI-MSM tool. PrEP knowledge was not related to willingness to take PrEP. Increased willingness to take PrEP was associated with increased self-perceived and objective HIV risk.

Conclusions: The high awareness of PrEP in this cohort is encouraging; the low uptake of PrEP, however, substantiates the importance of exploring barriers to uptake and adherence. Perceived cost and side effects remain significant barriers to uptake of PrEP. Sociosexual media remains an underutilized resource for outreach in the MSM community, especially in small to mid-size cities with less established MSM clinics and resources.

SSP2.03

A Scoping Review - HIV Prevention Cascade Mapping Tools

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Background: Significant gaps related to care continuity and systems navigation for prevention services exist for priority populations (PP) at increased risk for HIV, Hepatitis C and STIs (HIVSTBBIs) in Waterloo Region (WR). A comprehensive *prevention cascade* assessment tool could facilitate planning of individualized care pathways identifying needed supports, while fostering mitigation of HIV syndemics, and facilitating improved access to primary, secondary and

tertiary prevention for PP. Research is necessary to ascertain if any English language tools are currently available for facilitating HIV prevention cascade service mapping internationally.

Objectives: A scoping review identifying English-language HIV prevention cascade service mapping tools was conducted to systematically search, chart, and identify gaps in current literature (Van Vliet-Brown, Shahram, Oelke, 2017). Specific objectives include: to review peer reviewed and grey literature on HIV prevention cascade service mapping tools, identify common themes, and highlight gaps in the evidence base for such tools.

Methods: Using the framework developed by Arksey and O'Malley (2005) and further refined by Levac (2010), the stages of the review included: a) an academic and grey literature search for tools, b) screening of tools, c) selecting studies, d) charting the data and e) collating, summarizing, and reporting the results.

Results: A preliminary search identifies fewer than 20 tools specifically created to address linkages between prevention-focused services and retention across a care continuum for key populations. Further analysis is need to exhaustively assess and describe the number of tools currently available and the analytical capacity of each tool. In future, an implementation science approach, prioritizing development of standardized service mapping / gap analysis tools could facilitate a more appropriately resourced, coordinated and integrated community-led prevention response, elucidating the aetiology of gaps between expected results and observed outcomes for primary and secondary prevention (Schakman, 2010, Hirschhorn LR, Ojikutu B, Rodriguez W, 2007).

SSP2.04

"Mini Dial-a-Nurses" and "Good Brands": What Are the Desirable Characteristics of Online HIV/STI Risk Calculators?

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Objective: A wide variety of personalized risk self-assessment (PRS) tools ("risk calculators") for HIV/STI exist online, but there is little evidence on what constitutes suitable features. This study explored the desirable content and format of PRS tools to be effective in HIV/STI prevention and testing.

Methods: Five focus groups were conducted in Vancouver, Canada, with 5 HIV/STI prevention service providers and 12 potential users (4 youth, 3 gay men, 5 STI clinic clients) of PRS tools. Participants interacted with 5 online HIV/STI PRS tools selected for varied target audiences, completion lengths, and recommendation messages. Discussions centred on expectations, use contexts, perceived benefits and drawbacks, and tools' features. Participants also interacted with and discussed a BC-specific PRS tool. Session transcripts were examined to determine patterns and themes using an interpretive description approach.

Results: Participants offered several specific qualities that would make PRS tools more appealing, six of which are highlighted here: (1) PRS tools could be "mini dial-a-nurses" providing personalized risk assessments and testing recommendations based on users' specific sexual behaviours and HIV/STI-related concerns; (2) PRS tools should ideally both estimate risk and be sources of educational information; (3) Gay men felt that risk calculators should offer numeric estimates; (4) Service providers emphasized that the language and messages of PRS tools should help promote sex-positive sexual health attitudes; (5) PRS tools need a "good brand"—including acceptable name, satisfactory user experience and interface, recognized institution, and transparency about privacy; (6) PRS tools could explain why certain questions were asked, provide explanations for the results provided, and offer direction on next steps regarding risks and testing.

Conclusions: Participants identified several key components that would constitute an ideal HIV/STI PRS tool, with none of the tested tools meeting all of these criteria. These findings can help inform the design of future PRS tools.

SSP2.05

Confidence in the Effectiveness of Taking Viral Load Into Account as a Risk Reduction Strategy Among MSM in Montreal

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Background: Optimizing the use of biomedical risk reduction strategies could significantly reduce HIV infections among MSM.

Method: An online survey was used to gather data on knowledge and use of risk reduction strategies among MSM in Montreal. Bivariate analysis and multivariate regression were performed to identify characteristics associated with confidence in the effectiveness of taking viral load into account.

Results: There were 1028 respondents between May 2016 and January 2017. Most (74%) were HIV-negative, 10% did not know their status, and 15% were HIV-positive of whom 95% reported an undetectable viral load. Over half (65%) knew that taking viral load into account is a risk reduction strategy. Of these, 67% were very confident that this is effective. Compared to those with less confidence,

those who were confident are proportionally more likely to have heard about this strategy from a health worker (61% vs. 41%, p <0.0001) or looked up information themselves (44% vs. 34%, p = 0.022); to be HIV-positive (30% vs. 10%, p <0.0001); and to have had an HIV-positive partner in the last year with an undetectable viral load (50% vs. 30% , p <0.0001). They are also more likely to be very confident about the effectiveness of PEP (89% vs 77%, p = 0.001) and PrEP (96% vs 82%, p <0.0001). Multivariate analysis indicates being HIV-negative (aOR: 0.4, CI95% 0.22 - 0.66) and having had an HIV-positive partner in the last year with an unknown viral load (aOR: 0.2, CI95% 0.08 - 0.41) are associated with less confidence in the effectiveness of viral load consideration.

Conclusion: Health workers and frontline organizations play a key role in providing access to reliable information about biomedical strategies. Interventions and community education are needed that increase confidence in the effectiveness of undetectable viral load, PrEP, and PEP in an integrated way.

Criminalization, Law and Policy

La frontière médico-légale : criminalisation, droit, politique et résistance

SSP3.01

Steps Toward Ending Unjust HIV Criminalization in Canada: Federal and Provincial Developments

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On December 1, 2017, after years of advocacy by community organizations, both the federal and Ontario governments recognized the need to limit the "overcriminalization of HIV." Ontario issued a directive to provincial prosecutors that prosecutions for alleged HIV non-disclosure would generally not proceed in cases where a person living with HIV had a "suppressed viral load" (< 200 copies/ml) for six months. Justice Canada issued a report that goes further, recommending the criminal law also not apply to people living with HIV who are on treatment, not on treatment but use condoms, or engage only in oral sex (unless the person is aware of other risk factors that are present).

These developments represent a significant but modest step forward. The HIV community continues to seek concrete action by federal and provincial governments to implement the recommendations in a national Community Consensus Statement, released shortly before World AIDS Day 2017 and endorsed by over 150 community organizations. Spearheaded by the Canadian Coalition to Reform HIV Criminalization, and developed through months of cross-country consultation, the Statement shows clear consensus against the current overly-broad use of the criminal law against people living with HIV.

We analyze the evolving legal reality of HIV criminalization in Canada. We examine the HIV community's call for reforms to the *Criminal Code* in the context of past and current advocacy efforts, and for federal and provincial Attorneys General to develop prosecutorial guidelines to prevent further miscarriages of justice. Without further concrete steps, people living with HIV will continue to be prosecuted even in cases where there was no "realistic possibility" of transmission—the Supreme Court's legal test for assessing the risk of harm needed for a conviction—and people living with HIV will continue to face unjust charges driven by fear and an inadequate appreciation of the science.

SSP3.02

Legal Advances, Quasi-legal Actions: Evolution of Responses to the Overdose Crisis and Legal Options for Rapidly Scaling Up the Response Among People Who Use Drugs

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Canada's opioid overdose crisis continues. Deaths in 2017 exceeded those in 2016, as toxic fentanyl increasingly overwhelms the illegal drug market, and there continues to be a chronic inadequacy of life-saving harm reduction programs and drug dependence treatment services. Despite acknowledging a "crisis" in which the annual death toll is exceeding that of the early years of the AIDS crisis, in many settings, action by governments continues to fall short of the steps urged by advocates.

In the face of continued delays in securing funding, facilities and federal exemptions from possible criminal prosecution for "supervised consumption sites" (SCS) under the Controlled Drugs and Substances Act (s. 56.1), in several communities local harm reduction activists and service providers have opened unsanctioned, pop-up "overdose prevention sites" (OPS). These operate in a legal grey area, and have prompted an emergency order in December 2016 by the BC Health Minister directing their implementation where needed, and a new "class exemption" for at least some OPS in Ontario, issued in December 2017 by the federal Health Minister under CDSA s. 56 (rather than s. 56.1) as an interim measure.

To date, federal and provincial governments (other than BC) have refused to legally declare the ongoing overdose crisis a public health "emergency" and use powers available to them following such a declaration. However, provincial governments also have extensive powers under public health legislation that can be used, without declaring an emergency, to achieve many of the objectives sought by advocates – including ensuring that the premises, medications, equipment and other supplies are made available

wherever needed to address the ongoing overdose crisis. We review the potential use of those powers to scale up life-saving interventions rapidly for a population that is now not only at risk of HIV and HCV but also heightened risk of overdose.

SSP3.03

Criminalization of HIV Non-disclosure in Canada: Perspectives from Feminist Ethics

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Canada has the unfortunate honour of having one of the strictest laws against HIV exposure in the world, and some of the highest rates of prosecution under this law. Despite its stated intentions, this law does nothing to encourage people to disclose their HIV status to partners, will confine individuals to prisons that are not set up to treat HIV, and is based on discriminatory assumptions about people with HIV. Criminalization has no benefit to incidence of HIV in Canada and will undermine public health efforts of prevention along the way. While these effects have been widely discussed, this paper argues that the criminalization of HIV non-disclosure further marginalizes women in vulnerable positions, and fails to protect them in situations that involve violence. Additionally, the law will disadvantage victims of forced or coercive sexual assault, as it will change the standard by which consent is measured. Given the negative impact on a vast number of people in Canada, more effort should be made to protect people with HIV when they disclose their status, especially women in dangerous situations, and create structures that empower women's autonomy. These measures will do far more to benefit public health and society as a whole.

SSP3.04

Health Care Providers' Insight into Barriers to Antiretroviral Treatment Adherence in British Columbia (B.C.) Correctional Facilities

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Background: There is reportedly a 10-fold higher prevalence of persons living with HIV in provincial prisons compared to that of the general population, and an elevated risk of antiretroviral treatment (ART) interruption at various points of incarceration. Non-adherence to ART can negatively impact individual virologic and immunologic control and contribute to an increased risk of HIV transmission. Current literature on system and provider barriers to ART procurement from the perspective of providers and advocates within B.C.'s correctional system is limited. This study aims to identify these barriers and areas for potential focused intervention.

Method: Semi-structured interviews with frontline correctional healthcare providers and prison healthcare advocates in B.C. (N = 17) were conducted to identify factors influencing inmate adherence to ART. The interviews were audio-recorded and thematically analyzed using NVivo10.

Results: Ten major themes emerged within 3 broad categories of operational, provider and patient factors. Shorter length of stay, sudden transfers, and inability to access reliable healthcare information prevented timely initiation or continuation of ART. Healthcare providers felt limited by variable levels of HIV knowledge and experience, and prioritization of security over healthcare. Lack of patient confidentiality and fear of stigma leading to non-disclosure of HIV status to healthcare staff prevented consistent ART access. Challenges with linkage to appropriate community healthcare providers and services, and competing priorities (e.g. housing, transportation) posed a challenge in continuation of ART upon release.

Conclusion: ART adherence in correctional facilities is an ongoing and multifactorial issue. Healthcare providers working in B.C. correctional facilities identified patient, provider, and operational factors affecting ART adherence. These findings demonstrate the importance of creating an environment conducive to adherence support. Coordination with external HIV-services, such as centralized specialized pharmacy services and HIV clinicians, may provide the knowledge and support necessary for enhancing adherence within the correctional setting and upon release.

SSP3.05

People with Lived Experience of Criminalization Seeking Support from Community-based HIV Organizations: Gaps, Challenges and Insights

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Background: This paper elaborates findings from the first research project of its kind specifically examining the lived experiences of people who were criminally charged in relation to HIV non-disclosure and/or exposure in Canada, a country well known for its high rates of criminalization with over 180 individuals being prosecuted.

Methods: In qualitative interviews with 15 people across Canada who were charged, prosecuted and/or threatened with charges of aggravated sexual assault for alleged HIV non-disclosure, participants discussed their experiences with the police, lawyers, courts, the media, family, partners, and HIV community-based organizations (HIV CBOs). In collaboration with people who have lived experience of criminal charges, we mobilize a critically engaged ethnography approach grounded in the experiences of people targeted by the criminal law and public health institutions to examine the material consequences of being institutionally marked as a 'criminal' and a 'risk to public safety'.

Results: The focus of analysis for this paper is on interactions, supports, needs, and challenges that people who were criminalized faced when engaging with HIV CBOs during and after their criminal case and prosecution. The Canadian criminal justice system exerts its most punitive mechanisms toward people charged and prosecuted in relation to HIV non-disclosure, including long sentences, incarceration in segregation units, and life-long surveillance via sex offender registration. People who are criminalized lose much of their social support networks and experience intense mental health consequences, including post-traumatic stress disorder and frequent suicidal ideation. When seeking support from HIV CBOs, many experienced stigma, limited support, and a misunderstanding of their complex needs.

Conclusion: People who have been criminalized require complex supports that many HIV CBOs may currently not have the capacity to provide. Hearing directly from the experiences of those who have lived criminalization can provide insight for change.

Diverse Experiences of Living with HIV

Vivre avec le VIH au quotidien

SSP4.01

Smoking Rates, Physical Activity Level, Diet Quality and Perception Regarding Health Behavior Change Among People Living with HIV (CTN 288)

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Background: People aging with HIV face many challenges. Changes in health behaviors among people living with HIV (PLHIV) can help to prevent the emergence and progression of comorbidities. Behavior changes are in part related to individual determinants such as intention, attitude and perceived behavioral control.

Objective: To assess the prevalence of smoking, physical activity, diet quality and perceptions associated with their change among Canadian PLHIV.

Methods: An online randomized control trial is underway across Canada to evaluate the efficacy of a virtual nursing intervention to support the adoption of health behaviors. Participants are recruited via Facebook and clinic referrals. PLHIV must be ≥18 years, understand French or English and have Internet access. Data regarding smoking, physical activity level and diet quality in the past 7 days are collected. Participants are asked to choose one behavior on which they want to receive virtual support. Intention, attitude and perceived behavioral control regarding the possibility to modify the chosen behavior are also assessed. Outcomes are measured with a self-administered online questionnaire. Preliminary descriptive analysis of baseline data is presented.

Preliminary Results: As of 12/2017, 63 PLHIV have enrolled. Most of the participants were men (90.5%) and the median age was 49.3 years [IQR: 36.2-54.4]. During the last 7 days, 36.5% participants reported smoking, 7.9% were sedentary (i.e., no physical activity) and 17.5% ate ≥ 4 fast food meals. Overall, 57.1% chose to increase their level of physical activity, 27.0% to make better choices regarding fats in their diet and 15.9% to quit smoking. Regarding their chosen behavior, 30.2% reported high intention towards behavior change.

Conclusion: Preliminary data suggests that most participants chose to receive support to increase their level of physical activity. Success in adopting one health behavior could motivate the person to engage in another later. Recruitment and data collection are ongoing.

SSP4.02

Where and How Does Physical Therapy Fit? Integrating Physical Therapy Into Interprofessional HIV Care

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Background: Physical therapy has a role in helping manage the health related challenges associated with concurrent health conditions experienced by people aging with HIV. High level evidence exists on the effectiveness of physical therapy interventions for people living with HIV, however evidence to support the broader role of physical therapy in HIV care is still emerging.

Purpose: The objective of this study was to investigate the role of physical therapy in HIV care from the perspective of adults living with HIV and healthcare professionals with expertise in HIV care.

Methods: We conducted a qualitative descriptive study using semi-structured interviews and focus groups. We purposively sampled health care professionals and recruited adults living with HIV in collaboration with an HIV hospital in Toronto. We asked participants about their knowledge of and experiences with physical therapy, and perceptions of the physical therapy role in interprofessional HIV care. We analyzed data using content analytical techniques.

Results: Thirteen adults living with HIV and twelve health care professionals conceptualized physical therapy as positively influencing independence and social participation, and as a valuable ally in interprofessional collaboration. We developed a *Framework of Physical Therapy Role in HIV*

Care that describes (1) the multidimensional and client-centered role of physical therapy in addressing physical, psychological and social health domains; and (2) eight contextual factors important in the implementation and accessibility of physical therapy for adults living with HIV: aging, episodic nature of HIV, multi-morbidity, competing priorities, continuity of care, stigma, resource security, and social isolation. The interaction between contextual factors and health domains can influence the role of physical therapy.

Conclusion*:* The role of physical therapy in HIV is multidimensional. This Framework can be used by clinicians, community members, and policymakers in the design of services and referral to physical therapy for adults living with HIV.

SSP4.03

Confronting Comorbidity Risks: Gay Men's Integration of HPV-associated Anal Cancer Risk into their Narratives of Living with HIV

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Background: Human papillomavirus (HPV)-associated anal cancer is the most prevalent non-AIDS defining cancer affecting gay men living with HIV. Early detection is crucial, as anal cancer is often diagnosed late with poor outcomes. However, anal cancer screening is not widely available in Canada. Our study adds to the evidence in this under-investigated area, by exploring different approaches to screening (e.g. cytology/anal Pap smears) and treatment for HIV-positive gay men, and understanding their willingness to be screened.

Methods: We recruited 25 participants in Toronto for in-depth qualitative interviews about their experiences being screened in HPV-SAVE, a national anal cancer screening trial. Interviews were analyzed in NVivo using Grounded Theory. We recruited men with different cytology and histology results and treatment courses. The following results focus on their motivations to be screened and their responses to anal cancer as a comorbidity risk.

Results: Participants demonstrated minimal knowledge of anal cancer and did not consider themselves to be at high risk. A physician's recommendation was a key motivator to being screened. Participants responded to anal cancer as a comorbidity risk in two general ways—*accepting integration* and *resisting integration*. Those who were accepting were willing to integrate anal cancer risk into their narratives of what it means to 'successfully' manage HIV. Those resisting integration were critical about considering anal cancer a major health concern, as it took time away from managing other health priorities such as mental health or HIV.

Discussion and Conclusion: Comorbidities like anal cancer were understood in competitive relation to one another. Some participants resisted the idea of considering anal cancer a priority if they did not consider it central to their HIV-related health. Primary care physicians and health promotion efforts must emphasize how anal cancer screening and HPV vaccination are part of a holistic approach to HIV management.

SSP4.04

"They haven't made a slot for us yet": Implications of a Study on Older HIV-Positive Gay Men's Health Care Experiences for Policy and Practice

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Background: Given the growing population of aging HIV-positive adults in the era of chronic HIV care, the need for further inquiry on the experiences of older HIV-positive gay men is well substantiated.

This paper, which is based on the findings of a qualitative study designed to examine the health care experiences of older HIV-positive gay men, outlines implications of the research for policy and practice in health care and social services.

Methods: We recruited 16 Toronto-based HIV-positive gay men over the age of 49 to discuss their health care experiences in in-depth 1-1.5 hour semi-structured interviews. Using a grounded theory (situational analysis) approach, we analyzed the data inductively to generate themes and construct theory based on the accounts of participants. We conceptualized the implications of our work using an intersectional framework.

Findings: Participants commonly described expecting and experiencing stigma and discrimination in formal health settings, with many accessing community-based systems of care to avoid mainstream health services. These accounts, which varied depending on the socioeconomic conditions, cohort-specific experiences, and manifestations of systemic racism underpinning the social contexts of older gay men living with HIV, reflected prominent issues of inaccessibility among multiply marginalized participants.

Discussion: To account for and address the service needs of multiply marginalized gay men aging with HIV, our findings suggest the need for targeted service provider training, the development of specialized support services, and the mobilization of community-based skills and capacities. Finally, more research is needed to better understand the needs of racialized men, and adults ages 70 and older.

SSP4.05

HIV "In My Day": An Oral History of Gay Men Living with HIV and their Informal Caregivers during the Vancouver's initial HIV/AIDS Epidemic

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Background: In the mid-1980s, the HIV/AIDS epidemic rapidly accelerated within Vancouver's gay community with unprecedented sickness, death, and loss. People with HIV/AIDS faced an indifferent and homophobic provincial government. Given losses to age and suicide, there is an urgent need to document these early survivors' experiences lest this unique local history be lost.

Methods: Between July-December 2017, our community-based research team conducted 20 oral history interviews with gay men diagnosed with HIV/AIDS before 1996 and with caregivers who served extensive social/emotional support roles during Vancouver's early HIV/AIDS epidemic. Interviewees were asked about the first decade of the epidemic and how they were impacted by HIV/AIDS stigma, homophobia, racism, identity categories, and access to and quality of information. Additionally, we asked participants to share their perspectives on Vancouver's community mobilization and grassroots responses to the crisis. Our oral history approach allowed participants to narrate their experiences in greater detail and contribute their stories to a new digital archive.

Results: Participants' experiences were influenced by simultaneous identity categories (e.g., race, class, HIV status). While personal responses to the epidemic were numerous, most participants engaged in collective action, e.g. advocacy for improvements in and agency within healthcare, direct-action activism, informal caregiving roles. Some narrators participated in such activities, which brought them into a closer relationship with the broader gay community, but for a subset of our participants the epidemic contributed to alienation from this community. Participants' stories equally reflected narratives of personal and community resilience, trauma, and loss, thus attesting to the complex and lasting emotional impacts of the epidemic.

Conclusions: Collectively, participants' stories are essential to Vancouver's gay and HIV/AIDS histories, and should inform contemporary HIV prevention and treatment paradigms. HIV/AIDS histories must account for the variability and complexity of gay men's lived experiences, rather than imposing a cohesive but non-representative narrative.

SSP4.06

The Experience of Navigating the Ontario Healthcare System among International Students Living with HIV in Greater Toronto Area, Ontario, Canada.

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Background: Ethno-specific AIDS service organizations in Ontario have reported increasing number of international students living with HIV (ISHIV) in recent years. International students do not have access to the Ontario Health Insurance Plan and other government health programs. The private health insurance plans grant limited access and coverage to HIV medication and related healthcare services and test need to monitor the health of ISHIV. These treatment and access barriers posed threats to the health of ISHIV. The current study explores the experience of ISHIV in accessing treatment and care in Ontario in order to inform policies and programs to address these barriers.

Method: Interested ISHIV, who 16 years or older, are screened and invited to partake in a focus group or an individual interview. In addition, health, legal and settlement service providers with experience serving ISHIV are also invited to partake in a stakeholder focus group. All interviews are transcribed for coding and thematic analysis by the research team.

Results: In this presentation, we report on the preliminary results of the study, including the experiences of ISHIV in: (a) navigating the Ontario healthcare system; (b) accessing HIV treatment and care; (c) dealing with HIV stigma, language barriers and limited social support; and (d) the resilience strategies used by ISHIV to address their health and social needs. Further, we will report on the experiences and perspectives of community stakeholders in provide services and care to ISHIV.

Implications: Despite the impact of HIV on international students, ISHIV is a neglected and invisible population in HIV responses. The gap in the engagement of international students in the HIV prevention-treatment-care cascade has important individual and public health implications. The study findings provide key insights to inform needed policy and programmatic changes to bridge the gaps faced by this emerging vulnerable population.

SSP4.07

Patient Experience and Views on Antiretroviral Treatment - Findings from the Positive Perspectives Study

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Background: Despite advances in treatment of people living with HIV (PLHIV), a number of unmet needs remain. We conducted an international survey of PLHIV to explore their level of satisfaction with current treatment and potential areas of improvement for ARVs.

Methods: Qualitative in-depth interviews were performed with PLHIV to identify key hypotheses. A steering group developed the survey questions which was fielded online from November 2016 to April 2017 in 8 countries across North America, Europe & Australia. A mixed sampling/recruitment approach was used to ensure a broad cross-section of PLHIV. Respondents were screened for eligibility prior to receiving access to the online survey

Results: 1085 PLHIV completed the survey, 40% of respondents from North America (Canada, n=110). 25% were women, 34% $\geq$50 years, 49% diagnosed >10 years ago, 76% with co-morbidities, 98% on ARVs, 53% taking an STR. 87% of those diagnosed within last 2 years had started treatment within 6 months, compared to 40% of those diagnosed $\geq$ 10 years ago. Of those on treatment, 87% were satisfied with their ARV regimen. 33% had changed treatment in the last 12 months, - main reasons being reducing severity or frequency of side effects (43%) & reducing pill burden (31%). 72% of those on treatment (Canada, 75%) worried about long-term effects of ARVs. Reducing these (25%) and potential availability of longer lasting treatments (21%) were identified as the 2 most important potential improvements to current regimens. 62% were open to changing to a regimen with fewer drugs provided HIV remained suppressed. Demographics and results for North America were similar to overall global results.

Conclusion: In this international survey, the majority of PLHIV were satisfied with their current regimen, with reducing long term adverse effects of ARVs and a longer lasting treatment identified as the most important potential improvements

Engaging (with) Communities in HIV Research

Participation des collectivités à la recherche sur le VIH

SSP5.01

Patient Involvement in the Development of HIV-Specific Health Measures: Room for Improvement

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Introduction: The active involvement of patients in the development of health measures is being increasingly emphasized. It carries potential advantages of enhancing the relevance, validity, and usability of the measures, helping improve the quality of clinical care and research. However, patient involvement in research is often underreported, limiting its evaluation and improvement.

Objective: As part of a broader research initiative to construct an HIV-specific health measure, we intended to understand how people living with HIV (PLHIV) have been involved in measure development research, and how it has been reported in the literature.

Methods: We conducted a mixed studies systematic review for empirical research mentioning the involvement of PLHIV in the development of an HIV-specific health measure. We queried five databases: Pubmed, Medline, PsychINFO, Health and Psychosocial Instruments, and Embase. Study quality was evaluated with the Mixed Methods Appraisal Tool (MMAT). Content analysis was used to generate categories by which involvement and reporting thereof was assessed.

Results: We identified 4363 records. After deduplication, screening, and verifying eligibility, 39 studies were retained. The MMAT results revealed poor reporting of qualitative methods through which PLHIV involvement occurred (M = 1.33/4). The analysis indicated that focus groups (38%) and interviews (36%) were the most common methods of involvement, occurring at the level of consultation. It also underscored limited documentation of involved PLHIV: almost half of studies (44%) did not report the number of PLHIV involved, over a third (38%) provided no information on their characteristics, and most studies

did not report the sampling method (88%) or recruitment setting (62%).

Discussion: Consultative involvement methods appear favored in HIV health-measure development; further investigation is necessary to understand why these methods are used as opposed to methods involving PLHIV more directly in decision-making. The inadequate methodological reporting of involvement found highlights the need for reporting standards.

SSP5.02

Lessons Learned from Building Capacity for Community-Based HIV Stigma and Discrimination Research and Action in Manitoba

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Background: HIV-related stigma needs to be understood in the social and cultural context in which it occurs. Little is known about the experiences of stigma and discrimination among people living with HIV in Manitoba.

Description: Through a research partnership between communities affected by HIV, service providers and researchers, we aim to implement the *People Living with HIV Stigma Index* in three health regions, and develop actions to address stigma. The first phase of this project consisted of a community forum. The second phase (in progress) consists of investigating the experiences of stigma by administering the HIV Stigma Index with 60 Manitobans living with HIV.

Lessons Learned: We will highlight findings from the community forum and the lessons learned from building capacity for community-based stigma research in Manitoba. In particular, we will describe our processes to, and challenges of, building and sustaining engagement of the research team through acknowledgement of individual interests and ability to be engaged at different points in the research process and over time. We will describe the health regions chosen for implementing the HIV Stigma Index as ones in which we had existing relationships. A key feature of the HIV Stigma Index is its administration by peer research assistants. We will explain our rationale and approaches to hiring, training and supporting peer research assistants, who were recruited from communities most affected by HIV rather than academic institutions, and who have made valuable contributions to the project through recommendations for project implementation and participant recruitment.

Conclusions: Future plans include developing actions to reduce stigma in collaboration with the health regions currently involved in the project and expanding the reach of the project to additional regions. The lessons learned from these experiences can assist other communities in developing and implementing community-based stigma-related research and action.

SSP5.03

Enhancing Partnerships: Developing a Transitional Reintegration Intervention Program (TRIP) for Formerly Incarcerated People with HIV

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Background: The transition from prison to community is challenging for formerly incarcerated people, and especially so for those with HIV. The majority of incarcerated individuals with HIV return to their communities, yet programs to facilitate re-engagement with health and social services at the time of transition are often not available. We conducted a community-based project to develop a pathway of care, known as the Transitional Reintegration Intervention Program (TRIP), to meet immediate post-release needs of formerly incarcerated people with HIV.

Methods: We conducted brainstorming sessions with 39 formerly incarcerated people with HIV from across Ontario to identify challenges reengaging with health and social services, and a literature review of existing transition programs. A peer researcher synthesized the information and identified potential partner organizations who could meet the most immediate post-release needs of formerly incarcerated people with HIV in Ontario. Following individual meetings with each organization, a larger think tank with representatives of each agency was held to develop a working model of a TRIP.

Results: Findings from the brainstorming sessions identified seven priority areas for formerly incarcerated people with HIV: basic needs/financial, medical, mental health and substance use care, peer support, housing, education and training and life skills. Think tank participants described the following components of a TRIP as being essential: peer navigation, multiple entry points for the program (e.g. self-referral, bail office, social workers etc.), readily accessible directory of agencies with contact information and which priority area(s) addressed, tools for clients to organize post-release appointments and minimizing barriers to access for clients of the TRIP (e.g. forgoing multiple intake processes). A TRIP model was developed for pilot testing.

Conclusions: A peer researcher led project resulted in the creation of a TRIP for formerly incarcerated people with

HIV. Next steps include demonstration projects with one or more provincial jails.

Gay, Bisexual and Other Men Who Have Sex with Men (MSM)

Guais, bisexuels et autres hommes homosexuels actifs

SSP6.01

Understanding Undetectability: an Examination of HIV-positive MSM's Conceptions of Undetectable Viral Load

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Background: This study sought to understand how HIV-positive gay, bisexual and men who have sex with men (GBM) understand viral loads (VL) and undetectability.

Methods: Baseline data were collected from HIV-positive GBM (n=50), age14+, from a sample of GBM (n=589) across Ontario between July-October, 2017. Participants reported their most recent VL and information they were given with these VL results: 1) an actual VL level/number, 2) their detectability status (detectable/undetectable/other) or, 3) both. Participants were asked to answer in a textbox: "What do you think it means when somebody uses the term undetectable?" Thematic content analysis of text responses was undertaken and coded for emergent concepts that were grouped together into themes to extract meaningful results.

Results: The average time since HIV diagnosis was 9.6 years (IQR 3-13). Undetectability was reported by 92.0% (46/50) and most had ever taken (98.0%; 49/50), or were currently taking (94%; 46/49) ARTs. Nearly two-thirds (62.0%; 31/50) had a VL test within 3 months, 16.0% (8/50) in the last 3-6 months, and 12.0% (6/50) in the last 6-12 months. At most recent VL test, 68.0% (34/50) reported a VL <200 copies/ml, 6.0% (3/50) between 200-1000 copies/ml, zero above 1000, 8.0% (4/50) did not yet have results, and 18.0% (9/50) didn't know. Being told they were undetectable with no specific number was reported by 40.8% (20/49), 53.1% (26/49) were told they were undetectable along with their VL number, and 6.1% (3/49) were unsure/didn't remember. Our thematic analysis of participant's understanding of the term *undetectable* were grouped into four themes: (i) *tests reported low/zero viral levels* (56%, 28/50), (ii) *untransmittable/non-infectious to others* (50%, 25/50), (iii) *undetectable is my personal VL status* (36%, 18/50), and (iv) *being on/maintaining treatment* (20%, 10/50).

Conclusions: High levels of undetectability were reported among HIV-positive GBM, though the understanding of undetectability varied.

SSP6.02

HIV-Positive Gay Men's Knowledge and Perceptions of Human Papillomavirus (HPV) and HPV Vaccination: a Qualitative Study

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Background: HPV is the most common sexually transmitted infection worldwide. Gay, bisexual, and other men who have sex with men (gbMSM) living with HIV are disproportionately impacted by HPV-associated anal cancer, with rates about 100-fold that of the general population. Fortunately, HPV vaccination has proven efficacy in preventing both anogenital warts (condyloma) in males and anal cancer precursors in gbMSM.

Methods: We conducted in-depth, semi-structured interviews with 25 HIV-positive gay men in Toronto to gain an understanding of their knowledge and experiences related to HPV and the HPV vaccine. Participants were part of the HPV-SAVE Study, a Canadian study on anal cancer screening, and they received invitations for screening from their primary care doctors. Interviews were analyzed using NVivo qualitative software following a Grounded Theoretical Approach.

Results: Most participants had not received the HPV vaccine. Men described a lack of prior knowledge of the health consequences of HPV for people living with HIV, coupled with financial barriers to vaccine access. Participants did not articulate concerns with vaccine safety in general. Men frequently reported initial beliefs that HPV was predominantly—or exclusively—a risk for females or only young girls, and thus had not considered the vaccine necessary. Some participants remained uncertain if the current availability of the vaccine, and their newly acquired knowledge of its importance, was "…too little, too late" because of their age and/or HPV exposure.

Conclusion: Public health policy and health promotion strategies in Canada may have contributed to vaccine hesitancy among some HIV-positive men at risk for HPV associated cancers. Improving access and uptake of HPV vaccination requires addressing both financial barriers to access as well as increasing HPV health literacy, particularly by reframing the long-standing gendered associations of HPV. Clear, tailored messages about vaccination from healthcare providers would be beneficial for gbMSM, including gbMSM living with HIV.

SSP6.03

Barriers to Accessing Pre-exposure Prophylaxis (PrEP) for HIV Prevention: a Qualitative Analysis of Ontario's First Wave of PrEP Users

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Objectives: There has been increasing public health and community interest in the use of PrEP as part of a combination approach to reduce HIV transmission. We sought to inductively learn from the 'first wave' of PrEP users in Ontario to understand the everyday actualities of gaining access to this biomedical HIV prevention technology.

Methods: We conducted a combination of focus groups and individual qualitative interviews to inductively learn from the lived experiences of 40 gay men who were some of the earliest adopters of PrEP in Toronto and Ottawa. This included 16 men who had been on PrEP for at least one year as part of a demonstration project (November 2014-June 2016). Transcripts were coded in NVivo using a Grounded Theoretical Framework.

Results: Out-of-pocket costs emerged, perhaps not surprisingly, as a substantial barrier to overcome. Participants articulated challenges of first having PrEP *prescribed*—including finding a knowledgeable provider they could comfortably talk to about gay sexuality—and then actually being able to *fill their prescription*. Participants often had to attempt multiple entry points to successfully access PrEP, frequently relying on information they had obtained from their professional, social, or sexual networks. Some participants had to put in significant work to achieve *PrEP workarounds* that bypassed access barriers. For example, some participants described enrolling in a demonstration project because it gave them free access to PrEP for a year and *temporarily* allowed them to overcome access barriers. A number of men conveyed concerns regarding maintaining ongoing PrEP access.

Conclusion: Canada continues to face major equity gaps in linking PrEP to those who could serve to benefit most. While advances have recently been made to reduce some financial barriers to PrEP access (e.g., price reductions; availability of generics), access barriers will remain in the absence of universal pharmacare and more PrEP-knowledgeable, sex-positive healthcare providers.

SSP6.04

Does Being "Out" Affect the Health and Well Being of Gay and Other Men Who Have Sex with Men?

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While syndemics drive poor health outcomes among men who have sex with men (MSM), resilience speaks to the moderating factors that attenuate syndemic conditions and keep MSM health oriented. Being "out" has been suggested in some studies to have a protective effect among MSM. In view of this, we sought to determine how being "out" affected MSM's view of their health and their interaction with the healthcare system. Data from a recent survey of MSM in the Ottawa region were compiled and analyzed using SPSS software.

A total of 674 MSM completed the survey. Of these, 44% were out to everyone, 47% were out to some people and 8% were out to no one. Men who were out to everyone were more likely to live alone (34% vs 18%) and in an urban setting (68% vs 29%) compared to those out to no one. The vast majority of men who were out to everyone had sex exclusively with men (97%) while the opposite was true for men who were out to no one (13%). Comparing men out to everyone, to some, and to no one, there were no significant differences in engagement with the healthcare system, in self-reported physical and mental health, or objective measures of depression and anxiety. However, men who were out to no one compared to those out to everyone were more likely to have never tested for HIV or STIs (35% vs 4%), to be dissatisfied with their sex life (47% vs 25%) and feel uncomfortable discussing sex with their healthcare provider (55% vs 12%).

While being out was not associated with greater healthcare engagement or with better physical or mental health, men who were out to no one were more likely to be bisexual, avoid HIV/STI testing, and express dissatisfaction with their sex life.

SSP6.05

Understanding the Health and Healthcare Needs of Gay and Other MSM in Canada's Smaller Cities

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Little is known about the health and healthcare needs of gay and other men who have sex with men (MSM) living in and around Canada's smaller cities. To address this knowledge gap, we conducted a survey of MSM living in Ottawa and the surrounding regions. A total of 674 MSM, average age 44 years (range 18-83), completed the survey. The majority (83%) reported sex exclusively with men and the remainder were bisexual. With respect to HIV infection,

12% of respondents reported being positive although 8% either did not know their status or had never been tested. Based on the PHQ-4, 13% scored above the cutoff for depression and 17% above the cutoff for anxiety. Interestingly, 51% and 55% of those above the cutoffs for depression and anxiety respectively rated their mental health as average, good or excellent. Of the total sample, 30% reported dissatisfaction with their body image and there was a significant, moderate correlation between depression, body image dissatisfaction and sexual dissatisfaction. There were no significant differences between HIV seropositive and seronegative MSM in terms of their mental health. Only 44% of men were out to everyone. Men who were out to no one were more likely to be bisexual (87% vs 3%), live in the suburbs or rural setting (71% vs 32%), and have never tested for HIV or STIs (35% vs 4%). Of the total sample, only 5% consumed >15 alcoholic drinks per week while 12% used illicit drugs. The most commonly used illicit drug was cocaine and use was more prevalent among men living in an urban setting (8% vs 2%). Alcohol use was higher among men in rural settings (9% vs 4%) and among men over the age of 60. These data show MSM are a heterogeneous group requiring tailored health interventions.

SSP6.06

Comparing PrEP and the Birth Control Pill: Sexual Freedom, Empowerment and MSM

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In this paper, I explore the ethics of using pre-exposure prophylaxis (PrEP) as HIV prevention for men who have sex with men (MSM) by comparing it to the use of the birth control pill among women. The history of the birth control pill demonstrates how new medical technologies can positively affect the social lives of people who use them. There are many popular social objections to the use of PrEP by MSM that argue that PrEP actually increases risky sexual behaviour and negatively affects sexual morality. I find that it is helpful to compare PrEP to the birth control pill in order to respond to such objections because similar arguments were levelled against the birth control pill in the past. Although the birth control pill has increased sexual behaviour among women, this is not regarded as a reason to prohibit women's access to it or condemn it as a strategy for contraception. Empirical evidence demonstrates that the use of the birth control pill by women does not reliably increase their risky sexual behaviour. In fact, the birth control pill actually helps empower women by allowing them to take control of their sexuality and their sexual health. I argue that PrEP similarly empowers gay men, bisexual men and other MSM because it increases our control over our sexuality and our sexual health, which increases our sexual freedom in general. Furthermore, the comparison between PrEP and the birth control pill raises difficult questions about access to health care, responsibility, power, relationship dynamics, social acceptance and mental health. The birth control pill is not a perfect medical technology, but it is important to learn lessons from the experience of women using the birth control pill in order to optimize the use of PrEP as an HIV prevention strategy among MSM.

SSP6.07

The Role of the Host for Gay and Bisexual Men's Private Group Sex Parties: Reducing Harm in an HIV Risk Environment

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Background: Gay and bisexual men's GBM group sex events constitute HIV risk environments due to their association with polydrug use and concurrent sexual partners. However, previous research also revealed harm reduction practices associated with group sex events. This study focused on private group sex parties to explore party harm reduction practices of hosts.

Methods: Formative methodologies, including focus groups and a pilot study, resulted in an interview guide used for in-depth one-on-one interviews with twenty Vancouver Momentum Health Study participants who reported recently attending private group sex parties. We used a constant comparative methodology to analyze resulting qualitative data pertaining to the roles and functions of private group sex party hosts.

Results: The age range of study participants was 30-67 years, 40% were HIV positive, all had completed high school, one identified as bisexual, one as queer, and all others as gay. Participants reported that sometimes hosts provided condoms and lube during their parties. Equally, if not more importantly, before parties hosts used Internet and smart phone apps to screen potential attendees and disseminate party rules relating to substance use and/or sexual behavior, e.g., no crystal meth, only anal sex with condoms. Comparing private parties to other sex-on-premises group sex events like bathhouses, study participants emphasized hosts' roles before parties reduced uncertainty and risk and constituted "boundary play", previously defined as the paradoxical desire to remain safe within voluntarily entered dangerous situations[Ψ].

Conclusions: Results indicate that GBM Vancouver group sex private party hosts practice HIV harm reduction practices both before and during their parties, and suggest that education/intervention programs should include hosts to design safer, but still sexually exciting, group sex events.

Ψ O'Byrne, P. and Holmes, D. 2011. Drug Use as Boundary Play: A Qualitative Exploration of Gay Circuit Parties." *Substance Use & Misuse,* 46(12): 1510-1522.

SSP6.08

The Relationship Between HIV Status and Engagement in Drug Use During Sex: Findings from Ontario's iCruise Study

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Background: We sought to examine the relationship between socio-demographic characteristics and engagement in drug use during sex among a sample of gay, bisexual, and other men who have sex with men (MSM).

Methods: Data were drawn from baseline measures of #iCruise, an Ontario-wide online survey of MSM aged >13 collected between July-October 2017. Eligible participants for this analysis included MSM reporting any sex (contact with another person's genitals) in the past 3 months. Drug use during sex was defined as using crystal methamphetamine, GHB, cocaine, ecstasy, MDMA, ketamine, or poppers during sex in the past 3 months. Socio-demographics included: age, ethnicity, income, education, living in urban/rural area, sexual orientation and HIV status. HIV status was categorized as: HIV-negative not on PrEP/unsure of PrEP status, HIV-negative on PrEP, HIV-positive undetectable, HIV-positive detectable, and unknown HIV status. Multivariable logistic regression was used to examine the relationships between the socio-demographic factors and drug use during sex. A $p<.05$ was considered significant.

Results: Among all study participants, 44.2% (224/575) reported any sex in the past 3 months. Of those reporting any sex in the past 3 months, 78 (30.71%) reported drug use during sex. In the multivariable logistic regression, HIV status emerged as a significant factor associated with drug use during sex. Compared to HIV-negative MSM not on PrEP/unsure of PrEP status, HIV-negative MSM on PrEP (OR=4.65, 95%CI:1.67-12.95), and HIV-positive men with undetectable viral loads (OR=2.96, 95%CI:1.07-8.13) were significantly more likely to report drug use during sex. No other socio-demographics emerged as significant.

Conclusion: MSM with lower risk of possible HIV transmission due to being on PrEP or being undetectable were more likely to report drug use during sex. Future research in this area may elucidate if modern HIV prevention strategies (PrEP, viral suppression) are associated with drug use harm reduction strategies as well.

SSP6.09

Empirically Supported HIV and STI Prevention Counselling Programs for HIV-negative Gay, Bisexual, Queer, Two-spirit, and Other Men Who Have Sex with Men

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Background: Gay, bisexual, queer, two-spirit, and other men who have sex with men (MSM) continue to comprise the majority of new HIV infections in Canada and are disproportionately burdened by other sexually transmitted infections (STIs) as well. While access to HIV pre-exposure prophylaxis is likely increasing, there will remain a need to support sexual health through counselling programs that address topics such as knowledge about the transmission, diagnosis, and treatment of HIV and other STIs among MSM; navigation of personal sexual risk limits; sexual communication and negotiation with partners; and problematic substance use in sexual situations. This study sought to identify common characteristics of HIV and STI prevention counselling programs for HIV-negative MSM that were tested using randomized controlled trials.

Methods: We identified published articles from literature searches and published compendia of HIV prevention interventions (United States Centers for Disease Control and Prevention's *Compendium of Evidence-Based Interventions and Best Practices for HIV Prevention* and *High Impact HIV/AIDS Prevention Project*). Eligible studies included counselling programs for HIV-negative MSM evaluated through randomized controlled trials, which were published in English.

Results: We identified seven individual interventions, one couples intervention, and five group interventions that met criteria. The length of interventions ranged from one to ten sessions, and five of thirteen were peer-delivered. Characteristics present in multiple programs include the influence of social cognitive theory, use of motivational interviewing and role playing, identifying triggers, creating a plan for potentially challenging situations, and developing sexual communication skills.

Discussion: This information may be valuable to AIDS Service Organizations and other service providers as they choose which counselling programs to offer their HIV-negative MSM clients. This review should be repeated periodically to disseminate knowledge about new programs, as promising interventions continue to be developed and tested using randomized controlled trials.

Indigenous Health

Santé des Autochtones

SSP7.01

Aging With Wisdom: You Cannot Kill Us! Where Do Our Voices Go? Decolonizing Services and Supports for Indigenous Women Aging and Living with HIV

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Background: For years, Indigenous women have been voicing the need for separate safe spaces where they can be themselves together, free from stigma and violence. Yet, meager funding sources have evaporated and the only people who now are benefiting are those in positions of privilege within the mainstream HIV community. Where do the voices of Indigenous women go? Colonization and patriarchy have left a strong resistance to change, especially change from the people who are enjoying the status quo. The medications have improved and positive women are living 20 and 30 years longer than they imagined. They do not just want to live; they want to live well, supporting each other.

Methodology: Using a Two-eyed Seeing approach, a small but proud group of Indigenous women all aging with HIV gathered for four days of sequential sharing circles over a two-week period. The women shared – without fear of judgment or consequence – both the challenges as well as the things that brought them joy and made them well. They explored the services, supports, health and wellness interventions that they know will assist them and other women aging and living with HIV. The implications if one listens are profound.

Discussion: They need a positive Indigenous women's only space, cultural-based programming, self-determination and having a purpose to get out of bed every day. Just because you asked them once, does not make it about them unless they are the ones being empowered to envision, create, implement and facilitate their own services and supports. One group a month is tokenistic. They no longer want permission to enter. They want to see their faces across the front desk when they walk through the front door. Together, they questioned why funders are privileging the mainstream HIV services and supports that are not meeting all of their needs.

SSP7.02

Peers4Wellness: Indigenous, Peer-Led, Wellness Support for HIV and HCV Care

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Purpose: This research explores the feasibility of peer navigation to build capacity for culturally responsive care for Indigenous women (cis-women and trans-women) who are living with HIV and/or HCV in British Columbia (BC).

Background: Indigenous women are overrepresented among people in Canada who are living with HIV and/or HCV. This distribution is counter-mirrored for health care, where Indigenous women who are living with HIV and/or HCV are underrepresented. Peer navigation (PN) is emerging as a promising innovative approach to enhance the delivery of HIV health care. From an Indigenous perspective, PN might be of particular value due to its wellness relevant elements. The current landscape of PN research and practice is lacking an Indigenous focus, as well as a HCV and co-infection focus. This misses the mark from epidemiological, reconciliatory and practical perspectives.

Methodology: This research is a community-wide consultation with the following stakeholders: Indigenous women with lived HIV and/or HCV experiences, PN workers, and community-based organizations. Utilizing PN as a starting point, this project aims to assess the needs for HIV and HCV wellness support services among Indigenous women in BC, and to identify Indigenous-relevant frameworks to improve the capacity for culturally responsive HCV and HIV care for these women. The research methodology aligns with the Cultural Responsiveness Framework; it is foregrounded in community-based participatory research and Two-eyed-Seeing approaches.

Findings: Preliminary findings identified elements of a prospective Indigenous, peer-led, wellness-based navigation model (Peers4Wellness), which will enhance the cultural responsiveness of HIV and HCV care for Indigenous women in BC. We anticipate that our research will provide Indigenous and gendered lenses to augment emerging guidelines and programs for HIV and HCV peer navigation. It will also catalyze the development of an Indigenous toolkit for culturally responsive HIV and HCV care in BC.

Innovations in Community-Based Research

Approches critiques à la recherché communautaire

SSP8.01

Geospatial Methods to HIV Prevention: the State of the Art

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This review discusses current geospatial methods to HIV prevention research. An attempt is made to discuss the gaps in the methodology as well as in the discourse. Considering the complex, context-dependent, and heterogeneous nature of HIV, more and unabated attention needs to be given to fine-scale, international comparative, multi-method and interdisciplinary approaches. The social, historical, and political determinants of HIV also need to be given further attention. Lastly, the paper calls on geospatial HIV researchers to pay attention to data validation and ethics, complex underlying HIV-related determinants, and non-causality in their everyday discourse.

SSP8.02

Effectiveness of Culturally Appropriate Resilience Intervention Tool: Pilot Study Findings from Asian PHA Resiliency Dialogues

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Background: Asian people living with HIV/AIDS in Canada (APHA) face complex challenges related to racism, homophobia, and HIV stigma which impact on their sexual and mental health. To address these issues, Asian Community AIDS Service (ACAS) conducted a community-based research in 2013-2014 to identify culturally relevant strategies to promote their resilience. Drawing on the study results, evidence from existing literature and community consultation, an innovative group intervention, *Asian PHA Resiliency Dialogues (APHA-RD)*, was developed, in partnership with Alliance for South Asian AIDS Prevention and Ontario Positive Asians.

Methods: The APHA-RD intervention consists of three full-day sessions of integrated experiential activities and critical dialogue, and a 3-month reconnection session. APHA-RD supports participants to recognize individual and collective resilience; access strengths from their cultural identities and community connections; and apply transferrable resilience strategies across life challenges. Participation criteria are: self-identified as Asian and living with HIV, aged 18 and over, and living in the Greater Toronto Area. Data collection includes a pre-and post-intervention and 3-month follow-up questionnaire. Participants also partake in a 3-month post-intervention focus group to share their experiences in applying APHA-RD strategies in their everyday life.

Results: In this paper, we will report on the socio-demographic profile of the participants (N=30), and the quantitative measures of change among participants, including: (1) psychological flexibility, (2) individual resilience, (3) social support, and (4) community engagement. We will also report on participants' experience in taking part in APHA-RD and the facilitators and barriers they encountered in applying APHA-RD resilience strategies to addressing HIV related challenges.

Conclusions: The APHARD intervention shows promise in improving individual and collective resilience amongst the target population. Through affected community engagement, the pilot yielded valuable insights for refining the design of both the intervention and evaluation tools to support its next stage scale-up in the broader PHA communities.

SSP8.03

A Blended Learning Curriculum for Training Peer Researchers to Conduct Community-Based Participatory Research

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Background: Peer researchers (PRs) are research team members who share traits (e.g., gender, age, sexual orientation, diagnosis, etc.) with study participants. Some HIV/AIDS research funders can expect PRs to be equitably involved in a project. PRs often join a team without any formal research training, yet they are frequently tasked with suggesting appropriate language, recruiting participants, conducting interviews, administering surveys, analyzing data, and presenting findings. While there is literature on PR epistemology, PR hiring, and ethical considerations of PR engagement, research on training methods for PRs remains scant.

Training Curriculum: The framework of community-based participatory research (CBPR), principles of action learning, and the concept of reciprocity informed a 1.5 day (11.5 hour) blended learning curriculum that combined webinars, didactic in-person presentation, filmed simulation, and discussion. Training objectives included: a) building interview, presentation, and self-care skills; b) honing these

skills through practice; and c) improving team rapport and cohesion.

Results: This curriculum has been used to train seven PRs across two CBPR studies. Results of an anonymous, online evaluation indicate that PRs (n=7) understood and were comfortable with their role, felt valued, and were adequately supported. As one participant wrote, "[These were] my first experiences of peer research…the different learning methodologies prepared me well…role playing exercises were particularly helpful…they were videotaped and I could see myself on playback. Really useful!"

Conclusion: Thoughtful consideration of PR training contributes to more supportive work environments and strengthens the overall study, while decreasing the risk of unintended consequences (e.g., risk of subjective analysis, PR resignation). In the two micro-level instances reported here, a blended learning model resulted in a training environment that was accessible to PRs across multiple learning styles. This presentation will detail the curriculum while emphasizing the importance of strengthening the discourse of PR training methods and curricula.

SSP8.04

From Darkness to Light: Bringing HIV-Related Stigma to the Fore in British Columbia

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Background: Designed by and for people living with HIV (PLHIV), the *People Living with HIV Stigma Index* has been used to document experiences of HIV-related stigma in more than 80 countries worldwide. This paper will reflect on the process of implementing this tool in British Columbia – the first iteration of the project in a Canadian context.

Methods: Strongly rooted in the principles of community-based research (CBR) and the Greater/Meaningful Involvement of People Living with HIV/AIDS (GIPA/MIPA), the *BC People Living with HIV Stigma Index Project* has been guided and carried out primarily by people living with HIV. The BC research team has been evaluating the project's data collection and analysis phase using a variety of methods, including a data synthesis and process review session, steering committee and analysis/knowledge translation group decision-making outcomes, and evaluation interviews with Peer Research Associates.

Results: Evaluation efforts to date highlight key learnings in a number of areas around implementation and data collection: building relationships with community organizations to support the research; determining appropriate ways to compensate community partners; altering the international tool to best suit local contexts; how best to engage with peer researchers to achieve successful data collection; identifying necessary supports for peer researchers; and connecting the research team with harder-to-engage rural and remote populations.

Conclusions: Evaluation of this phase of the *BC People Living with HIV Stigma Index Project* has provided insights and recommendations for further research on HIV-related stigma and discrimination in Canada that will be particularly useful to other provincial teams as the *Canadian People Living with HIV Stigma Index* is implemented across the country in the coming months.

SSP8.05

Mobilise!: Empowering Men Who Have Sex With Men (MSM) in a Community-Based Participatory Research (CBPR) Intervention on HIV Prevention

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Background: In Canada, MSM continue to be disproportionately affected by HIV. Emerging prevention approaches promote community mobilization to increase resilience, capacities, and empowerment. Attention must be paid to how participants' contexts and choices shape interventions.

Objective: To analyze processes of mobilization and empowerment in Mobilise!, a Quebec-based CBPR intervention focused on including MSM in knowledge-production and -translation.

Intervention: 'Leaders' were trained in dyads to facilitate discussion activities in which MSM could express their views on HIV prevention and services. They then recruited participants and organized activities on their own terms.

Methods: Leaders completed a logbook on characteristics of participants and of their activity, and participated in semi-structured interviews on their experience and views about the intervention. A descriptive analysis of participants and a content analysis of logbooks and interview transcripts focusing on four dimensions of empowerment (Ninacs 2008) were undertaken.

Results: 17 activities with 3 to 13 participants (n=79) recruited in community organizations, among friends/acquaintances, and on social media were organized by dyads (except 3 organized by individual leaders). Concerning dimensions of empowerment, leaders' logbook/interview comments suggest the following : 1) Critical consciousness: leaders found variance/diversity in MSM's interest, will, and ability to participate, adapted activities accordingly, and stressed participants' information gaps; 2) Participation: leaders built on existing social/virtual networks, but, to a lesser extent, also attempted to include people considered as marginalized in prevention (e.g.,

immigrants, PLHIV); 3) Competencies: leaders confirmed/developed their skills to create socially-adequate contexts and favour non-judgmental dialogues; and 4) Self-esteem: the intervention confirmed/enhanced leaders' knowledge of prevention/services, communication/group-facilitation skills, and interest in community organizing.

Discussion: Mobilise! included individual MSM in tailored interventions developped from their training as leaders, and building on their social networks, knowledge, and skills. They generated creative and adapted spaces balancing conviviality and inclusivity that revealed a need for dialogue among MSM.

Innovative Programming and Policy

Programmation et politiques innivatrices

SSP9.02

Engagement in Online STBBI Testing Through GetCheckedOnline on Vancouver Island

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Introduction:

GetCheckedOnline.com (GCO) is an online sexually transmitted and blood borne infections (STBBI) testing service, allowing clients to test without visiting a clinician. GCO is meant to address multiple barriers to STBBI testing, including stigma, privacy, primary care provider access, wait times, and financial limitations. The BC Centre for Disease Control (BCCDC) launched GCO in Vancouver in 2014, and then expanded to Vancouver Island in 2016 in partnership with Island Health Authority.

Methods: Routinely collected GCO and BC Public Health Laboratory data were used to examine uptake on Vancouver Island from March 2016 to August 2017. Client demographics and risk characteristics were assessed, along with key program outcomes including service uptake, testing history, and positivity rates.

Results: GCO was implemented in three Vancouver Island communities (Victoria, Langford, Duncan). In the first 19 months, 1232 GCO accounts were created, with 51% (632) of clients testing at least once for STI, 47% (579) of clients testing for HIV, and 28% (164) testing for HIV more than once. Of the 961 testing episodes completed, 93% (892) included an HIV test, leading to the diagnosis of 2 HIV cases (0.2% positivity) and 35 (4%) other STIs (chlamydia, gonorrhea, syphilis).

Males were more likely than females to complete HIV testing (51% vs 41%); youth (<30 years) were less likely to test for HIV than adults over 30 years (43% vs 52%). Men who have sex with men (MSM) comprised 50% of all HIV testing episodes among males. 24% of clients indicated that they were testing for HIV for the first time.

Conclusions: GCO is providing a low-barrier STBBI testing service on Vancouver Island, reaching both first-time HIV testers and the MSM community. Planning is underway to expand the program to other underserviced communities in Island Health Authority.

SSP9.03

A Community Based Approach to Innovative Programming Established in Response to a Community HIV Epidemic

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Ahtahkakoop First Nation is a community that has responded to a crisis of HIV diagnosis' in 2010. The response of leadership, the health team, and partners was a focused and innovative response to addressing the community issue. The program concept model is focused on meeting the client "where they are at" and working with the clients. The model embraces a case management approach that is lead by a Registered Nurse and Community Support Worker. Holistic services are brought to the client at the community level. This model has lead to the achievement of UNAIDS target of 90-90-90.

Engagement of clients occurs through the case support worker and nurse through providing clients harm reduction services. The harm reduction program consists of provision of education, counselling, screening and testing, holistic support, injection supplies, naloxone kits, access to opioid replacement therapy and referrals to other needed services. Clients engaged in harm reduction services are followed up with support from Mental Health, Addictions Counselling, and options for traditional Indigenous practices. Strong partnerships have been developed with the community treatment facility, Cree Nations Treatment Haven, for clients' access to daily observed opioid suppression therapy and linking their antiretroviral (ARV) with their methadone.

Clients receive clinical services through the Nurse Lead clinic in the community. The clinic also provides access to visiting Infectious Disease Specialists that come to the community 6 – 8 times per year. The nurse lead clinic helps to make sure blood work, immunizations and outstanding orders are up to date and done prior to doctor visits.

SSP9.04

The Canadian Webinar Series on Sexual and Reproductive Health and Rights of Women Living with HIV

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Background: In February 2017, the World Health Organization (WHO) released the *Consolidated Guideline on the Sexual and Reproductive Health and Rights (SRHR) of Women Living with HIV (WLWH)*, centred around the values and perspectives of women for the first time. The guideline challenged countries to develop country-level action plans for advancing SRHR of WLWH.

Methods: As a Canadian response, the Canadian HIV Women's Sexual and Reproductive Health Cohort Study (CHIWOS) partnered with five leading Canadian HIV organizations to design and deliver a webinar series, in collaboration with the WHO and the IBP Initiative. Learning objectives included: (1) Defining constraining and enabling environments that shape WLWH's SRHR; (2) Presenting Canadian research findings; (3) Disseminating Canadian best practices for addressing SRHR; (4) Showcasing the importance of community-academic partnerships and a commitment to the meaningful involvement of WLWH; and (5) Developing a national action plan to advance SRHR for WLWH.

Results: We hosted an inter-disciplinary webinar series on four prioritized SRHR topics: 1) Trauma- and violence-aware care; 2) Supporting safer disclosure; 3) Reproductive health, rights, and justice; and 4) Self-efficacy and resilience. Consistent with recommendations from the Truth and Reconciliation Commission, each webinar was conducted under the guidance of an Indigenous Elder or Knowledge Keeper. A targeted national and international audience of over 100 academic, community, practitioner, government, and funder stakeholders attended each webinar. Webinars were recorded and are available online. Webinar participants engaged with topic-specific perspectives from WLWH, CHIWOS research findings, and implementation best-practices from care providers, followed by a moderated discussion. Priorities emerging from presentations and discussions were captured to inform the action plan.

Discussion: Through an international and national academic-community partnership, this webinar series created an essential opportunity for Canada to demonstrate global leadership in prioritizing women-centred approaches to advancing actions to improve the SRHR by, with, and for WLWH.

SSP9.05

A Peer Led Feasibility Study of a Dr Peter Centre Evening Program for People with HIV Over 50 Who Identify as Gay or MSM and Experience Food Insecurity and Social Isolation

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Issue: As a community-based organization informed by clinical experience and peer research associates, we believe there is a group living with HIV who identify as gay men or as men who have sex with men and experience social isolation and food insecurity, who are at risk of treatment interruption. Although this group is often defined as 'semi-stable,' we believe that due to the culminating impacts of aging and managing multiple comorbid mental and physical conditions, they are an emerging at-risk group.

Description: This pilot evening program sought to explore the impacts of social isolation and aging with HIV among the target population through an integrated program with four main components: individual and group counselling, art, music, and recreation therapy, a nutritious communal dinner, and opportunities for peer support and socializing. Our qualitative results indicate that this combination of program components was successful in engaging hard-to-reach participants in the evening program, and helped to mediate impacts of aging and social isolation as they related to physical decline, grief, loss, and stigma.

Lessons Learned: The peer-led nature of this program throughout conception, design, recruitment, and evaluation was crucial to reaching this hidden and self-isolating population. Part of the success of this pilot can be attributed to the unique blend of programming, dinner, and peer support, which culminated in a powerful therapeutic program of interest to this group.

Recommendations: This feasibility study furthered the conversation on HIV and aging by demonstrating a need for integrated approaches to address the multiple challenges faced by those aging with HIV. Our findings indicate that the integrated services offered in this program were successful in engaging a hard-to-reach population by providing numerous entry points into HIV care, and reflect a need for similar programming for this population.

SSP9.06

Healthcare Professionals Implementing and Managing Harm Reduction Programming in a Toronto Based HIV Specialty Hospital

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Healthcare service delivery for people living with HIV (PLWH) is impacted when the person engages in the use of illicit drugs (substance use). Substance use while hospitalized can negatively effect continuity of care, optimal treatment adherence, increase unplanned discharges, and lead to poorer quality of and satisfaction with care. To improve care for PLWH Casey House, a sub-acute care HIV specialty Hospital in Toronto, identified harm reduction (HR) as a priority 'Quality Project'. In June 2012, a Harm Reduction Working/Advisory Group (HRWAG) formed and became operational, with a focus on informing, educating, and guiding service delivery for PLWH who use substances. HRWAG currently consists of 12 front line healthcare professionals (nurses, social workers, health care aids, recreational therapist, administrative staff, and the volunteer coordinator).

HRWAG implemented several HR initiatives that benefit PLWH who are receiving in-patient care, as well as members of the community who are able to access safer use drug kits made available at Casey House. Examples of HRWAG initiatives include development of HR equipment distribution, development and presentation of HR information sessions and materials for patients and hospital staff, nutrition support at time of hospital discharge and several others that incorporate a HR approach to healthcare delivery. Several HRWAG initiatives have been evaluated to assess their overall impact on healthcare delivery for PLWH and barriers and facilitators to operationalizing the overall program have been identified.

Taking an innovative approach, this presentation will provide lessons learned through a working group comprised exclusively of frontline healthcare professionals on the promotion and implementation of HR in in a healthcare facility; these lessons have directly informed hospital programming and policy development. These findings can be utilized to inform quality improvement initiatives in the provision of healthcare for PLWH who use substances.

SSP9.07

Using Social Media to Connect Patients to PrEP Providers

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Truvada for pre-exposure prophylaxis (PrEP) has been available in Canada since 2016. Men who have sex with men (MSM) often connect with one another through the use of sociosexual meda such as Grindr. Data suggests that while MSM who use sociosexual media are more knowledgeable about PrEP, many are at-risk by not connecting with PrEP providers.

Using an advertising campaign targeting at-risk MSM through social media such as Grindr, Facebook, and Google, we sought to increase awareness and connect individuals to the PrEP Clinic in Hamilton, Canada. A clinic website was set up concurrently allowing for a self-risk assessment and self-referral to our PrEP clinic.

Referral rates increased dramatically from 2.3 referrals per month on average prior to the campaign, to 20 per month during the campaign. In the months following the campaign, referral rates fell to 11.3. Self-referred patients were less likely to present to their initial clinic appointment compared with physician-referred patients. One hundred thirteen referrals have been received overall including 77 during the campaign. Fifty-five patients are currently on PrEP and followed by our clinic.

We have demonstrated effective use of social media to increase knowledge and access to PrEP. During the advertising campaign we experienced a dramatic increase of referrals and, as expected, a mild decrease after the campaign had ended. While self-referred patients were less likely to present to their initial appointment, these patients are now more knowledgeable about PrEP and how to access it within our community. Furthermore, we have established a model for other medium-sized communities within Canada to increase awareness of PrEP and ultimately provide PrEP to high risk individuals within their community.

Intersecting Identities and HIV Contexts

Identités et VIH : contextes en croisement

SSP10.01

The Pervasiveness of Trauma: Understanding the Intersection of Trauma and Housing Amongst People Living in an HIV-Specific Housing Facility

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Background: People living with HIV (PLHIV) experience disproportionate rates of lifetime trauma, including physical and sexual abuse. Historical and personal traumas can influence the spaces in which PLHIV live and access support services. However, little is known about the intersection of trauma within the context of HIV-specific housing, and how such housing environments impact the experi-

ences of PLHIV. Understanding this relationship is important given the role of housing within the risk environments of PLHIV. As such, we examined how participants' trauma histories shaped their experiences living in an HIV-specific non-profit-operated housing facility, and impacted their health and drug-related outcomes.

Methods: Semi-structured, qualitative interviews were conducted with 24 PLHIV who were current or previous residents of the housing facility. A community researcher co-facilitated 10 interviews. Participant recruitment was ongoing until thematic saturation was reached. Data were analyzed using NVivo qualitative software, with attention paid to how the structural vulnerability of participants and the social-structural environment of the housing facility shaped participants' experiences.

Results: Participant narratives highlighted the pervasiveness of trauma histories, which largely intersected with participants' social locations (e.g. gender, race). Such trauma experiences often influenced participants' engagement with supportive services in their housing environment. In particular, the social and operational environment of the housing facility at times re-traumatized participants and created barriers in mitigating the impacts of trauma in their daily lives. Further, participant accounts illustrated how their lack of service engagement was, in part, an effort to overcome trauma histories and seek 'normalcy,' as well as avoid re-traumatization.

Conclusions: The social and operational environments of this housing facility were inadvertent contributors to the ongoing traumatization of participants. Our findings underscore the need for enhanced and tailored supportive services, as well as the integration of trauma-informed practice, within supportive housing services for structurally vulnerable PLHIV.

SSP10.02

Analysis of HIV/AIDS Health Promotion Coverage of Disabled People in Canadian Newspapers and Academic Literature

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Purpose: HIV/AIDS is an ongoing public health and health promotion issue. Good governance for health and health literacy are two aspects of health promotion. Disabled people face unique challenges in relation to treatment and prevention of HIV/AIDS and as such health promotion faces unique challenges in relation to disabled people. Given the important role of health promotion in HIV/AIDS, the vulnerable position of disabled people, the influence newspapers have on the public and the need to generate evidence for best practice through academic endeavors our study aimed to provide quantitative and qualitative data answering the research question.

Objectives or Questions: How are disabled people covered in HIV/AIDS health promotion literature in Canadian Newspapers and academic articles?

Methods: We searched three academic databases (Scopus, Ebsco All with its 70 databases and Pubmed) and a database covering Canadian newspapers (Canadian newsstream) for the terms "HIV", and "Health promotion" in conjunction with any of these terms: "disabled people", "people with disabilities", "disabled", "with disabilit*", 'impairment", "impaired", "intellectual disabilit*", "visual impairment", "physical disabilit*","deaf". Descriptive quantitative and thematic qualitative data was generated.

Results and Findings: N=621 newspaper and n=7896 academic articles included the terms "HIV" and "health promotion". After elimination of duplicates and non-relevant articles, n=12 academic and n=1 newspaper article covered disabled people. Our presentation will cover themes found in the n=13 articles; e.g. all articles thematized the exclusion of disabled people in HIV/AIDS health promotion.

Conclusions and Significance: Our findings suggest that public education and academic evidence is lacking on best practices of HIV/AIDS health promotion for disabled people, which hinders a positive change in the HIV/AIDS situation for disabled people. As well, this decreases the eradication of HIV since the disabled cohort is seldom included in prevention discourse.

People Who Use Drugs and HIV

Le VIH et les utilisateurs de drogues

SSP11.01

Post-discharge Peer Telephone Intervention Concerning Adherence and Substance Use: Participant Goals and Expectations

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Background: Hospital discharge can be a time of high risk for negative outcomes, discontinuity of care, and non-adherence to medications; active substance use further complicates the transition. Peer interventions may be a helpful and cost-effective complement to post-discharge support to improve adherence and self-efficacy. Within a framework of community-based participatory research, we

are piloting a peer telephone support program for people who use drugs.

Program Description: People living with HIV in hospital (Casey House), who actively use substances, and who struggle with antiretroviral adherence are invited to participate. Participants work with a nurse to set goals (e.g., medication adherence, substance use) and identify supports for post-discharge. Participants are matched with a peer volunteer who is also living with HIV and who has a history of substance use. They meet in-person prior to discharge, and arrange to connect by phone over 6-weeks. The goals and supports plan provides a reference for peers to support adherence and individual goals.

Methods: Data collection includes chart abstraction, phone logs, and interviews with participants and peers. We present here the preliminary analysis of participant goals and program expectations.

Results and Conclusion: Goals that participants identify with a clinician align with goals discussed with peers in their initial meeting. Most participants feel comfortable meeting a peer, and share in greater depth their health challenges and hopes. Peer identity is important; as one participant said, "we are in the same boat and same struggles". Peers may also provide additional incentive to maintain health achieved in hospital; as another participant said, "…hard to take the medication…this kind of program will push myself to completely take the medication." This presentation will discuss how these initial interactions can lead to meaningful peer support, including barriers and facilitators to engagement, with implications to consider targeted goal-setting and peer engagement during discharge.

SSP11.02

Perceptions and Attitudes toward Pre-Exposure Prophylaxis Among Drug-Using Street-Involved Youth In a Canadian Setting

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Background: Young people who use drugs have an elevated risk of HIV transmission, and represent a key population for HIV prevention efforts. Pre-exposure prophylaxis (PrEP) – a biomedical prevention tool involving daily medication to prevent the transmission of HIV – has been advanced as strategy for lowering HIV transmission among such key populations, and yet understand of drug-using young people's views toward this prevention tool are poorly documented. This study examines perceptions and attitudes toward pre-exposure prophylaxis (PrEP) for HIV infection among drug-using street-involved youth in Vancouver.

Methods: We conducted qualitative interviews with twenty-five participants, aged 17-24, recruited from an ongoing prospective cohort study comprised of drug-using street-involved youth. We analyzed interview transcripts thematically, focusing on perceptions and attitudes toward PrEP, knowledge regarding HIV transmission, and the identification of perceived high-risk practices and populations.

Results: Street-involved youth expressed ambivalent toward PrEP, particularly young men. Among participants, ambivalence toward PrEP primarily stemmed from their perception that they were not 'at risk' of HIV transmission and that HIV risks were context-dependent (e.g., low syringe availability). There was a misperception regarding pathways for HIV transmission (e.g., salivary transmission, skin contact transmission). Even though participants reported engagement in HIV risk behaviors (e.g., condomless sex, syringe-sharing) in contexts that undermined drug and sexual risk reduction, they believed that they had low risk for HIV acquisition. Participants commonly referred to themselves and peers as `clean' in comparison to `dirty' individuals (e.g., people who were homeless) and commonly reported that they were able to visually identify individuals with HIV based on physical appearance and hygiene.

Conclusion: There remains a need for HIV-related educational programming (including PrEP) among drug-using street-involved youth to address HIV risks and increase the potential uptake of PrEP. However, addressing contextual forces driving HIV risks will also remain necessary.

SSP11.03

Examining the Disconnect Between the Priorities of People Who Use Illicit Drugs and Public Health Interventions to Improve HIV and Hepatitis C Prevention

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Introduction: Many public health interventions with people who use drugs (PWUD) began as drug user "survival strategies", forms of mutual aid developed by and for PWUD in response to health risks and structural violence. An example is the "Satellite Sites", a low-barrier harm reduction program where PWUD are employed by a community health centre to run satellite harm reduction programs within their own homes. We examine the negotiations that emerge between the priorities of PWUD and those of public health authorities when running this type of intervention.

Methods: Data from an ethnographic study, including 6 months of participant observation in Satellite Sites, and qualitative interviews with Satellite Site Operators (SSO), clients and program managers were collected; thematic analysis was used to examine key themes.

Results: The key priority of public health interventions is to prevent the transmission of HIV and HCV, and the occurrence of overdose. In contrast, the key priority of SSO and clients is a steady supply of good quality drugs, and sterile equipment to use them. When the two sets of priorities

are in alignment, programs are successful. Misalignment stems from structural factors such as the operation of drug markets, where PWUD buy drugs together to save money, and then share equipment such as cookers and cottons to prepare them, exposing themselves to the risk of potential HIV and HCV transmission.

Conclusion: Implementation of public health guidelines in these spaces results from alignment of priorities. Incomplete implementation, while rare, illuminates potential areas where risk for HIV and HCV transmission may occur. Focusing on structural-level factors such as the functioning of drug markets and their influence on drug-buying and using practices allows for the identification of areas of continuing risk, and how they intersect with the vulnerabilities faced by PWUD.

Social, Structural and Systemic Drivers of HIV

Moteurs sociaux, structurels et systémiques du VIH

SSP12.01

Enhancing HIV Health Outcomes: A Participatory Approach to Mobilizing Communities Against HIV-Related Stigma

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Background: Stigma acts as a profound stressor in the lives of people living with HIV (PLWH), negatively affecting health outcomes. This national, community based research (CBR) study will implement the PLWH Stigma Index in Canada to document the intersections of HIV-related stigma and resiliency factors, using the process and resulting data to mobilize communities for advocacy. The PLWH Stigma Index is a global tool developed by and for PLWH to capture these experiences, and has been implemented in over 90 countries. Since 2013, PLWH and allies have been working in the formative phases of the HIV Stigma Index; here we describe the steps taken and the outcomes of mobilizing diverse interest groups, sectors, communities and individuals.

Objectives:

To describe the lessons learned in five years of community mobilization, governance and research to implement the PLWH Stigma Index in Canada. We describe the opportunities and challenges to meaningfully engage PLWH and allies in governance, CBR and knowledge transfer and exchange (KTE) skills, and enhancing their civic involvement.

Methods: This multi-faceted implementation included forming sustainable governance/leadership structures; collaborating with related stigma-research initiatives; training, mentoring and support of peer research associates; and building community-grounded knowledge exchange products.

Results: Mobilization efforts in 2017 created diverse regional and national steering committees of PLWH to guide the implementation process, facilitate participatory action and engagement by community stakeholders, and produce knowledge exchange products. The collaboration between PLWH and researchers operationalized the greater involvement of PLWH (GIPA), while engaging communities on HIV stigma-reducing activities and programming.

Conclusions: The study acknowledges the role PLWH serve in facilitating research and developing program/policy changes that address the social, structural and systemic drivers of stigma. Although mobilization of PLWH has been fruitful, we identify challenges associated with: inclusion, logistics and tensions between health-enhancing programming, community-based research practices and funder requirements.

SSP12.02

Identifying and Plugging the Leaks: Gaps and Policy Barriers to Engagement with the HIV Cascade of Care

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The objective of this project was to identify policy issues that affect treatment access for people living with HIV (PLWH), and to explore opportunities to make the healthcare system more accessible for these individuals.

Methods:

- Review of existing research on the HIV Treatment Cascade in Canada:
  - Issues accessing healthcare for PLWH generally
  - Issues specific to populations disproportionately impacted by HIV.
- Qualitative interviews with
  - Service providers: questions covered the scope of their work with PLWH, role supporting PLWH to access healthcare/ stay on treatment, barriers they see impacting access to healthcare
  - PLWH [Focus groups representative of the epidemic in Ontario (ex: ACB community, individuals who use injection drugs, etc.)]: questions covered experiences with health care in their city/region, how living with HIV has changed their healthcare experiences, challenges with engaging in/accessing healthcare.

Results:

- 2 comprehensive literature reviews completed
- 27 service provider interviews, and 11 focus groups completed
- Numerous policy barriers identified.

- Supplementary research on relevant federal/provincial policies completed.

Conclusions:

- Partnerships key to project success.
- Numerous challenges exist for PLWH, service providers, policy makers in engaging with the healthcare system in Ontario
- This project has fostered opportunities for:
  - Service providers to more effectively advocate for client needs.
  - Community-based agencies to organize/promote policy change to enhance treatment access.

This is the first time that literature and research documenting barriers to engagement in the HIV Cascade of Care has been gathered/completed to then inform an analysis of policies, within Ontario, that are further exacerbating barriers to healthcare for PLWH.

Combining current research, with current policy, presents a springboard for community, and those living with HIV, to advocate for systematic change to address the barriers to engaging in care within Ontario.

SSP12.03

Confronting Stigma and Discrimination: Results from the BC People Living with HIV Stigma Index study

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Pacific AIDS Network, Vancouver, BC

Background: The BC People Living with HIV (PLHIV) Stigma Index study was the first implementation of the international *PLHIV Stigma Index* tool in Canada. Designed by and for PLHIV, this study engaged PLHIV participants across BC. In this analysis, we explore participant experiences of stigma and discrimination and responses to confront HIV-related stigma and discrimination.

Methods: Participants were recruited through quota sampling to achieve diversity in sex, age, sexual orientation, cultural background, and health region. Peer-researchers administered the in-depth survey in a side-by-side format, with participants and peer-researchers discussing each question. Participants provided demographic information and answered questions about experiences of stigma and discrimination, as well as practices around confronting stigma/discrimination. Descriptive statistics were used to summarize stigma/discrimination experiences, and bivariate statistics (t-test, Chi-square) to examine relationships among participant characteristics and confronting stigma/discrimination.

Results: Adult PLHIV in all five BC health regions completed the survey (N=176). Participants were 38% female; 60% of male participants were MSM; 71% were 30-50 years old; 23% Indigenous; 30% used/use injection drugs; and 50% had lived with HIV for 10+ years. The majority were involved in the HIV positive community (15% indicated no involvement). Participants had a wide range of stigma and discrimination experiences (e.g., at least once in the last 12 months, 31% had been excluded from social gatherings, 30% had been physically harassed or threatened). The majority (52%) had confronted or educated someone who was stigmatizing or discriminating against them, and 33% had sought help from an organization to resolve a stigma/discrimination issue. Demographic characteristics were not significantly associated with confronting/educating others; however, self-reported health and involvement in the HIV community were significantly associated with confronting/educating.

Conclusions: Peer-researcher interviewing produced rich information on stigma experiences and responses. While stigma and discrimination were pervasive experiences in participants' lives, the majority had confronted stigma/discrimination.

The Health of African, Caribbean and Black Communities

La santé des collectivités africaines, antillaises et noires

SSP13.01

Challenges of an Invisible Epidemic: Tailoring HIV Prevention Interventions for Young Black Women in Canada

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This article explores the experiences of young African, Caribbean, and Black (ACB) women (ages 15- 29) in Canada regarding HIV prevention interventions. Existing interventions for young ACB women in Canada are explored with relation to success in reducing HIV transmission. This paper attempts to ascertain what community-based efforts have been made to tailor HIV prevention interventions for young ACB women, by conducting a meta-analysis of current literature. This paper also addresses challenges faced by young ACB women that put them at increased risk for HIV and other sexually transmitted infections. Structural barriers such as racism, poverty, sexual violence, lack of access to healthcare, and stigma are explored as barriers to HIV prevention.

In that vein, I address the following questions: 1) What existing HIV prevention interventions are implemented in Canada that specifically focus on young ACB women? 2) What major issues are challenges to HIV prevention interventions for ACB women? And 3) What successful prevention interventions can be adapted to tailor HIV prevention interventions for young ACB women?

A consideration of this research is to highlight how the intersectional nature of race along with class and gender

creates challenges in developing HIV prevention interventions for ACB women. This paper follows the theorectical framework of Black Feminist Theory to explore how ACB women are positioned within structures of power. In Canada, there is scant evidence based research regarding ACB women sexual health promotion or HIV prevention. Through the use of Participatory Action Research,this paper is intended to add to this scholarly discourse, and will include practical strategies for use by researchers and community practitioners in HIV prevention in the ACB community, specifically with young women.

SSP13.02

Access to Family Doctors and its Impact on Health Outcomes: Implications for ACB people and PHAs living in Waterloo Region, Ontario

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In Ontario, two factors may have an effect on the health outcomes of African, Caribbean, and Black (ACB) people including those living with HIV/AIDS. First, there is a dearth of family doctors in Canada and nearly 17% of Canadians lack one. Gentrification in the Toronto area has also pushed racialized families further out of the core and into smaller urban regions such as Waterloo. Access to a family doctor is critical to improving health outcomes, especially for people living with HIV/AIDS (PHAs). Racial discrimination at the systemic and individual level, socioeconomic status, and stigma are hypothesized to discourage adequate access to and retention of a family physician and hinder prompt diagnosis, leading to poorer health outcomes. Urban regions with smaller populations of ACB people may be poorly equipped to address the complex needs of their new residents.

In partnership with the AIDS Committee of Cambridge, Kitchener, Waterloo and Area (ACCKWA), I, an ACB woman, endeavored to identify the barriers and facilitators to accessing the care of a family doctor in Waterloo Region for ACB people, with a specific focus on PHAs. Utilizing both critical race theory and a community-based participatory action approach, this presentation will report the findings of an ongoing research project that engages 60 ACB participants in focus groups and interviews to understand their experiences in attempting to access healthcare in the past and preferred actions to improve access in the future. This work contributes to the scarce knowledge regarding healthcare access for ACB people living in smaller urban regions, specifically access for PHAs. Findings of this work can contribute to the development of culturally competent care for ACB people and PHAs, and can be used by family physicians, municipal and provincial health service providers, and community service organizations similar to ACCKWA to improve health care access.

SSP13.03

Influences of Sexual Behaviours and Vulnerability to HIV/AIDS Among Heterosexual ACB Youth Living in Windsor, Ontario

Tiyondah K. Fante-Coleman, Ciann L. Wilson, Ashley-Ann Marcotte, Raymond M. McKie, Robb Travers, Ellis Furman, ACBY Team
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Very little research has investigated relationships among heterosexual African, Caribbean, and Black (ACB) youth and the behavioural expectations that young men and women have of their partners. This study identifies factors that influence such expectations of behaviour in general, and the ways in which ACB youth's sexual behaviour shapes vulnerability for HIV. This presentation will draw from a research project nested within the Promoting and Owning Empowerment and Resilience among African, Caribbean, and Black Youth (POWER) project in Windsor, Ontario, Canada. Six focus groups were held and attended by twenty-six African, Caribbean and Black youth.

Data were transcribed and analyzed following thematic analysis guidelines. Irrespective of ethnicity, ACB youth adhered to the traditional gender roles prescribed through cultural heritage and dominant youth culture. They were also impacted by the social norms of their peers. Gender inequality persists among young ACB youth especially concerning female partner autonomy and decision-making within relationships. Socio-political history, as well as youth and dominant culture, are hypothesized to shape and influence normative gender roles for ACB youth, influencing relationship behaviours with one another. Considering the dearth of research that exists concerning ACB youth and expectations of sexual behaviour these findings contribute to an area of research that is critical to tailoring interventions to this population.

SSP13.04

Systemic Obstacles Impacting the Health Equity of Newcomer African, Caribbean, and Black Men Living with HIV/AIDS

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Studies have show that individuals from the African, Caribbean, and Black (*ACB*) communities account for a disproportionately high number of people in Ontario living with HIV/AIDS (Husbands et al., 2014). From 1985 to 2011, an estimated 4,348 persons from ACB communities were diagnosed with HIV in Ontario, of whom 2,119 (49%) were male (African and Caribbean Council on HIV/AIDS in Ontario, 2013). Of all new HIV diagnoses, persons from ACB communities accounted for the majority of heterosexually acquired HIV infections (Barrett & Mulugeta, 2010). This qualitative study utilized a focus group methodology in an initial attempt to explore the experiences of immi-

grant, refugee, and non-status ACB men living with HIV/AIDS within the context of a broad range of health equity concerns. Of the eight individuals who participated in the focus group, four (50%) were of African origin, two (25%) were of Caribbean origin, and two (25%) were of Jamaican origin. Half of the sample, four (50%), identified themselves as men who have sex with men (MSM), and three (37.5%) identified themselves as men who have sex with women (MSW). Topics discussed in the focus group included experiences seeking information regarding their health care, primary health care delivery, HIV specialized care and mental health services, barriers to obtaining health related information, and suggestions on how to improve health equity for ACB men living with HIV/AIDS. The data collected were analyzed utilizing a hybrid thematic analysis approach where emerging themes were considered important for describing the phenomenon (Daly, Kellehear, & Gliksman, 1997). Our findings indicate the need for more culturally sensitive support services, greater involvement of HIV organizations with ACB men, greater sensitivity from immigration staff, more guidelines regarding HIV disclosure for healthcare providers, efforts to tackle HIV-related stigma, and a recognition of the challenges posed by traditional gender role norms.

Trans identities and Communities

Identitée et communautés trans

SSP14.01

"You have to create your own safety": How Trans Sex Workers Managed Displacement from an Outdoor Work Environment in Vancouver, Canada

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Background: Trans sex workers who work in outdoors settings may be vulnerable to HIV, violence, and health inequalities due to a complex interplay of social-structural factors, including the criminalization of sex work, economic barriers, and stigma. This study is the second phase of a project examining how gentrification and construction of a trans outdoor work environment impacted sex workers in Vancouver, Canada.

Methods: This study nested within a longitudinal community-based research project (AESHA) used data from semi-structured interviews with 33 trans sex workers conducted between June 2012 and May 2013, 4 ethnographic walks of the trans outdoor work environment conducted between August 2015 and August 2016, and a focus group with trans sex workers conducted July 2016. Eligibility included a) identifying as a person whose gender identity or expression differed from their assigned sex at birth, b) having exchanged sex for money, c) residing in Metro Vancouver, and d) being 18 years of age or older.

Results: Construction and gentrification severely disrupted client traffic and as a result there were few trans sex workers still working in the area. Participants reported a number of ways of managing this displacement, including moving to different work areas – some of which felt less safe – as well as changing work hours due to the construction. Scarcity of clients greatly impacted the wellbeing of participants and resulted in participants working outdoors alone. While many felt working online would be helpful, few participants reported working online due to fear of criminalization and the cost of placing ads.

Discussion: Within a criminalized context, the construction and gentrification of this work environment enhanced vulnerabilities to HIV and violence. Sex workers must be meaningfully included in decisions on urban planning and sex work laws must be changed to increase the safety of trans sex work environments.

Women and HIV

Les femmes et le VIH

SSP15.01

The Importance of Sex for Women Living with HIV in Canada

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Objectives: Sexuality of women living with HIV is often viewed as non-existent. To offer an alternative discourse, we explored the importance of sex for women living with HIV in Canada.

Methods: We used baseline questionnaire data from the Canadian HIV Women's Sexual and Reproductive Health Cohort Study (CHIWOS), a community-based research project across British Columbia, Ontario, and Québec. We excluded 135 participants who provided invalid responses to the main study variables (final n=1,289). Women living with HIV aged 16 to 74 were asked, "Overall, how important a part of life is your sexual activity?" with responses on a 5-point Likert scale. Sex was defined as partnered oral, anal, or vaginal sex. Multivariable logistic regression was used to identify factors associated with sexual importance.

Results: Women were diverse in gender (4.2% trans), sexual orientation (12.6% lesbian/queer), race (28.2% African/Caribbean/Black, 22.6% Indigenous, 41.9% White), and age (9.8% under 30, 27.5% 50 and over). Approximately half viewed sex as very (19.6%) or somewhat important (32.3%) to their lives, while the remaining reported that sex was neither important or unimportant (22.0%), somewhat unimportant (5.4%), or not at all important (20.1%). Women who had a regular sex partner [AOR: 12.36 (95% CI: 7.64-19.99)], were more educated [2.51 (1.33-4.74)], believed HIV treatment prevents transmission [1.84 (1.18-2.88)], or had better physical-health related quality of life [1.15 (1.01-1.31)] reported greater importance of sex, while those who were older [0.66 (0.52-0.83)], used illicit drugs [0.47 (0.26-0.85)], or experienced violence in adulthood [0.49 (0.29-0.84)] reported lesser importance.

Conclusions: The value of sex in women's lives was highly diverse. Those with partners, better physical health, and higher social power rated sex as more important. These results refute the stereotype that women living with HIV are non-sexual and underscore the influence of contextual factors on women's perspectives on sex.

SSP15.02

Social Oppression, Sexual Coercion and Marital Duty: the Drivers of HIV Among Immigrant Afro-Caribbean Women in Canada

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Background: ACB women account for the largest number of new HIV infections in Canada, especially those emigrating from countries with generalized HIV epidemics. The MSAFIRI Study uses mixed methods to characterize the social drivers of HIV acquisition in African, Caribbean and Black (ACB) immigrant's post-migration to Ontario. We present a novel analysis of the relationship dynamics leading immigrant women to acquire HIV.

Methods: In-depth interviews conducted with a purposive sample of ACB participants, who identified their source partner and were infected post arrival. Analysis based in grounded theory.

Results: Participants included 21 women (4 Canadian born) of median 41 years' age (range, 28-63); 52% were from Africa and 42% from the Caribbean. Participants had immigrated at diverse time-points; median time to HIV diagnosis post-migration was 14.5 years (range, 2-38). Participants' source partners were either their immigration sponsors, or men still residing in participants' countries of origin (infection occurring post-migration during a trip "home"). Relationship dynamics were governed by women's precarious immigration status, and financial and emotional dependence on the source partner, asserting dominance over them. This lack of control surfaced in participants' accounts of sexual activities that led to HIV acquisition. Sexually coercive acts were consistently reported by study participants, regardless of socio-demographic characteristics, acts that they were seldom able to openly acknowledge or resist.

Conclusions: HIV acquisition among Afro-Caribbean immigrant women reflected in a culture of social oppression, marital duty and silent sexual coercion. The hierarchal structure of participants' intimate relationships, lack of formal employment, coupled with fear, trust and dependence upon their partners - all tied to their immigration status – left them in a state of HIV vulnerability. There is cause to explore culturally competent HIV prevention strategies through sustainable programming that builds their capacity to resist the oppressive dynamics that drive their risk for HIV.

SSP15.03

Courses of the Emotional and Sexual Lives of Women Living with HIV: From Biographical Disruption to Reconstruction

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Université du Québec à Montréal (UQAM), Montréal, QC

Background: Living with HIV, a highly stigmatized condition, disrupts the sexual and emotional dimensions of women's lives. Antiretrovirals therapy has considerably increased the life expectancy of women living with HIV (WLHIV) and allowed them to recover their desire for a fulfilling sex life. The objective of this study is to document the emotional and sexual lives of a group of WLHIV who participated in the evaluation of personal development program "PLURIELLES" for WLHIV.

Methods: This community-based study enlisted sixty WLHIV (M = 48 years) with diverse ethnic in Quebec (Canada). They have been living with HIV for 12 years. Most are mothers (79%), were single (70%) and were sexually active (25%). A concomitant mixed-methods triangulated design

was used to evaluate the program's effects (after 6 months) on sexual wellbeing. The analyses are derived from the qualitative component of the study. Semi-structured interviews, lasting approximately 90 minutes, were conducted at baseline. A typological analysis producing ideal-types (Schapper, 2005) was used to identify typical courses in the lives of WLHIV, grouping together similar sexual and emotional experiences.

Results: Three typical courses were identified: 1) HIV as a biographical disruption: life courses marked by discontinuity and adversity; 2) isolation for self-preservation: life courses characterized by stigmatization, rejection and confinement; 3) openness to new perspectives on relationships: life courses that lead to biological reversal or reconstruction.

Conclusions: These results provide a greater understanding of the specificities and needs of WLHIV in regards to sexual health and are relevant for the design of interventions that are better adapted to them.

SSP15.04

HIV+ Women 50+ Stigmatized and Discriminated

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Introduction: HIV+ Women who are 50+ are facing Stigma and discrimination while disclosing their status to their family, friends, community, and partners. GIPA/MIPA would require that HIV+ women are empowering and educating other HIV+ women so they too can become leaders in the community. The issues they are facing are stress, depression, isolation, and trauma (mental health issues). HIV disclosure is one of the important issues that these women are faced with and need support around how to disclose and when. This creates issues with adherence to medications, accessing services and education for HIV.

Method: Creating social groups in safe places for the women to come together to learn from each other regarding the issues they face being HIV+, a safe place where they can speak about relationships, medications, health issues, and accessing services and programs. It is a place to empower and interact with each other and build each other's capacity and knowledge of HIV and its related issues. They gain a sense of family and connection through cooking, sewing, knitting, and other subjects that women can bond, engage and learn. Peers who run these groups would receive training in supporting each other as Home Based Care providers, and facilitators. This will help with those whose English is a second language. Women can take tours of the agencies and learn about the services available to them.

Results: The women who attended this group have come out of isolation and are now supporting and mentoring other women. Allowing the women to become activist and advocate for their communities. They are seeking out more services and attending more training provided by their local agencies.

Conclusion: Demographic of those attending the group 87% identify as female, 13% identify as transwomen. Age 45-50+ 28%, 50+ 72% attended group sessions.

SSP15.05

Looking at the Levels: Examining the Nuances of Tiered Antiretroviral Therapy (ART) Adherence among Women with HIV in Canada

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Background: Challenges to optimal ART adherence are gendered. We measured ART adherence among women living with HIV (WLWH) using standard (≥95%) and tiered levels to explore associations with viral suppression and psychosocial correlates.

Methods: We analyzed survey data from the community-collaborative Canadian HIV Women's Sexual and Reproductive Health Cohort Study (CHIWOS) collected between August 2013 and May 2015. Among women reporting currently receiving ART, we measured self-reported ART adherence in the previous month (Walsh Visual Analog Scale) using two definitions of adherence: dichotomized (≥95% of pills taken versus <95%) and tiered (≥95%, 80-95%, 50-80%, and <50% of pills taken). Viral suppression was assessed as undetectable (<50 copies/mL) versus detectable via a validated self-reported measure. Multivariable models were developed using logistic regression (dichotomized adherence) and ordinal logistic regression (tiered adherence; sociodemographic and psychosocial models).

Results: Of 1178 women included, 73.5% reported ≥95% adherence, 16.5% reported 80-95%, 6.7% reported 50-80%, and 3.3% reported <50%. Higher adherence (dichotomized and tiered) was associated with viral suppression ($p<0.001$), however 82% of those reporting 80-95% adherence achieved viral suppression.

Within the multivariable model of tiered adherence, food insecurity versus secure (adjusted odds ratio [AOR]: 0.73; 95% confidence interval [CI]: 0.54-0.97), incarceration within the past year versus never (AOR: 0.32; 95% CI: 0.19-0.55), violence experienced as an adult versus no (AOR: 0.53; 95%

CI: 0.34-0.83), and negative self-image (AOR: 0.98; 95% CI: 0.96-1.00) were independently associated with lowered adherence, while high resilience scores were associated with higher adherence (AOR: 1.04; 95% CI: 1.02-1.06). A caveat to this trend was observed among women with adherence <50%, who often showed fewer markers of marginalization relative to the 50-80% adherence category.

Conclusion: Analyses of tiered adherence allows a nuanced identification of gendered and social risk factors for non-maximal adherence among WLWH. Addressing marginalization among WLWH may increase ART adherence.

SSP15.06

African, Caribbean, and Black Women Know Your Status HIV Prevention Project

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Background: Despite efforts to promote and increase uptake HIV testing remains sub-optimal despite its importance in the continuum of care. This project aimed:

1. To increase uptake of HIV testing among African, Caribbean, and Black (ACB) women in Toronto through development of a community-based situated HIV testing intervention
2. To increase capacity of community-based organizations working with ACB people to support/offer HIV testing within their locales.
3. To determine the feasibility of the community-based HIV testing intervention

Methods: Through 4 community consultations with 29 participants and a scoping literature review, we identified 3 community-based HIV testing strategies, which were adapted for a Canadian context:

1) 'Girlfriends Session': single-session intervention (2-hour) "parties", with HIV risk-reduction information, informal assessments and POCT held at a home of an ACB woman from the target population with a wide social network; 2) 'Girlfriends Session' held at community-based organizations (CBO) and faith groups serving ACB persons to host a gathering for ACB women (i.e. University student clubs, a Christian church, Toronto Community Housing Corporation (TCHC), etc.) and offer POCT; and 3) Outreach events (cultural, music festivals, parades – i.e. PRIDE, Afrofest, etc.) with POCT.

Results: A total of number 156 participants were tested using all 3 strategies; of which 98% got tested and 26% had never been tested before. 96% of those who tested strongly agreed and agreed that they would get tested again. 94% of those who tested strongly agreed and agreed that they were satisfied with their experience. 96% of those who tested strongly agreed and agreed that they felt that their confidentiality was protected.

Conclusion: The pilot exhibits feasibility for optimizing HIV testing amongst ACB women. We've brought a national team together to develop a national HIV testing intervention using this pilot as the basis and exploring other sources of funding

Youth and Adolescents

Jeunes et adolescents

SSP16.01

"I found more humanity with homeless people than almost ever before": Experiences of Unstably Housed Youth Living with HIV

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Background: H[illegible]ng [illegible]tability and homelessness significantly [illegible] youth population. A substantial populatio[illegible] [illegible]le living with HIV (PHAs) are dealing with ho[illegible]le[illegible]nes[illegible] Housing is a key determinant of health that [illegible] improves the health related outcomes for PH[illegible] under representation of PHA youth within housing res[illegible]arch perpetuates the absence of their experiences, and marginalizes them from the systems of access and stability. This community-based research study aims to explore the housing and access issues, the individual, systemic and structural barriers that PHA youth experience, in order to generate evidence to initiate discussions, programs and policy changes.

Methods: Both quantitative and qualitative data collection methods are used. Fifty surveys and 30 in-depth interviews will be conducted with youth, 16-29 years of age. Two peer research assistants were trained in both quantitative and qualitative data collection methods and interviewing skills. Qualitative data are analyzed using thematic analysis. This presentation is based on the themes generated from the preliminary data collected.

Findings: Unstably housed PHA youth experienced discrimination based on sexual orientation, income and employment status, race, HIV status and mental health, when trying to find housing. Safety and fear of evictions caused additional anxieties. Partner violence and violence and/or abuse related to HIV status and sexual orientation were prevalent experiences. Addictions, anxiety and depression were experienced by majority of the youth. Food security and isolation were other struggles they contended

with. Internalized stigma prevented youth from accessing services. Resilience was apparent as many dealt successfully with addictions issues, returned to school and/or were engaged in employment.

Conclusion: Access to safe and affordable housing improves mental health, reduces substance use, improves employment and educational opportunities and strengthens resilience among youth living with HIV.

SSP16.02

"It's important, because in the street, you don't have condoms": a Qualitative Analysis of Sexual Health Services Use by Homeless Youths

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Context: Homeless youths face various sexual health problems (e.g. high prevalence of HIV and STBBIs, and sexual violence; Leclerc et al., 2013; PHAC, 2006), but tend to underutilize sexual health services (SHS). Yet, little is known about the motivations to use SHS among homeless youths.

Objectives: To document SHS use among homeless youths and to better understand the role played by living conditions play in the SHS use among homeless youths.

Method: Semi-structured interviews were conducted with 33 homeless youths (17 men, 16 women) in Montreal. They were aged 18 to 25 years (mean=22). Qualitative material was coded following the de- and re-contextualization steps proposed by Tesch (1990).

Results: Four profiles of SHS use among homeless youths were identified. Profile 1 (N=6) is characterized by a low use of SHS, as youths report systematic condom use with their sexual partners. Profile 2 (N=11) is composed of youths who report high-risk sexual behaviours, but do not use SHS as everyday survival takes precedence over sexual health concerns. Profile 3 (N=5) is characterized by youths who frequently use SHS, especially testing centres, despite having little sex activity. Using SHS appears as a way for them to get control over their health while living in health-threatening conditions. Profile 4 (N = 11) is composed of youths who engage in survival sex work. They use SHS on a regular basis to get routine STBBIs testing, and get counseling and support about sex work, sex workers' rights, and safety.

Conclusion: Motivation to use or not use SHS among homeless youths is influenced by their experience of homelessness, which appears to alter the meaning of their sexuality. This study shows that SHS need to adapt to the diverse profiles of homeless youths in order to prevent HIV and STBBIs among them. Implications for intervention are discussed.

SSP16.03

Maximising HIV+ Teens' Preparation to Successfully Transition from Pediatric to Adult Care: an Integrated Programming Model

Nicci Stein, Samara Carroll, Dorothy Odhiambo, Chilombo Olawoye, Melody Lotfi
The Teresa Group, Toronto, ON

Background: Adolescents born with HIV can experience isolation, anxiety, depression, and low self-esteem. They face issues related to intersecting discrimination related to race, HIV and socio-economic status and lack opportunities to discuss these issues and seek support. These struggles impact their transition into adult care. Different kinds of teen-focused programs offer opportunities to address these issues. We describe program design, facilitation and evaluation that create a strong base for youth to transition to adult care.

Methods: 14 adolescents born with HIV, aged 15-18, participated in 3 different programs:

In-clinic groups at SickKids Hospital

Semi-annual 8-session, closed therapeutic group, "Leading the Way" (LTW)

Annual one-week Counsellor-in-Training (CiT) leadership development retreat

Participants were recruited to programs through the clinic or because their families were clients at The Teresa Group. Parental consent was required for participation. Data was collected through a range of methods including case notes, observation and outcome evaluation surveys.

Results: 6 participants attended all three programs. 8 attended two out of three – LTW and CiT (4); clinic and CiT (3) and clinic and LTW (1).

In-clinic group was the initial point of contact for most participants where high levels of trust facilitated connections with peers and sparked interest in joining other programs. Therapeutic groups deepened the connections and exploration of issues. Leadership training included knowledge building as well as practical experience.

Those who participated in all three programs demonstrated increased social support networks, decreased isolation and loneliness and increased self-esteem, factors associated with successful transition to adult care.

Conclusions: A combination of group programs effectively prepares participants for transition to adult care. Programs that form, build and deepen their peer networks and build skills, help them feel better prepared to navigate the adult world.

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